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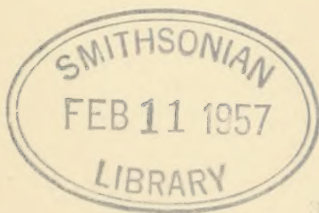
The *Proceedings*, begun in 1878, are intended primarily as a medium for the publication of original papers, based on the collections of the National Museum, that set forth newly acquired facts in biology, anthropology, and geology, with descriptions of new forms and revisions of limited groups. Copies of each paper, in pamphlet form, are distributed as published to libraries and scientific organizations and to specialists and others interested in the different subjects.

The dates at which these separate papers are published are recorded in the table of contents of each of the volumes.

The present volume is the ninety-third of this series.

The *Bulletin*, the first of which was issued in 1875, consists of a series of separate publications comprising monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, catalogues of type specimens, special collections, and other material of similar nature. The majority of the volumes are octavo in size, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable. In the *Bulletin* series appear volumes under the heading *Contributions from the United States National Herbarium*, in octavo form, published by the National Museum since 1902, which contain papers relating to the botanical collections of the Museum.

ALEXANDER WETMORE,
Assistant Secretary, Smithsonian Institution.



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¹ Date of publication.

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THE NEARCTIC SPECIES OF PARASITIC FLIES BELONGING TO ZENILLIA AND ALLIED GENERA

By WENDELL F. SELLERS

THIS paper is a revision of the known species of parasitic two-winged flies belonging to the genera *Zenillia*, *Phryxæ*, *Carcelia*, *Aplomya*, *Siszyropa*, *Thelymyia*, and a new genus (p. 107) (Diptera: Larvaevoridae). It includes also some Palearctic species of the genera *Zenillia*, *Phryxæ*, *Carcelia*, and *Aplomya* and some Neotropical species of the genera *Zenillia*, *Carcelia*, and a second new genus (p. 106).

In 1897 Coquillett² placed the species belonging to this group of genera in *Exorista* Meigen, 1803. However, Coquillett³ pointed out in 1910 that *Exorista* is monobasic, with *Musca larvarum* Linnaeus as the type, a species that is not congeneric with those referred to *Exorista* by Coquillett in 1897 and subsequently by other authors. In 1924 Aldrich and Webber⁴ selected *Zenillia* Robineau-Desvoidy, 1830, to replace *Exorista* of authors, not Meigen. More recently Townsend⁵ has expressed the opinion that the treatment proposed by Aldrich and Webber combines several widely distinct elements under one generic name. By contrast Townsend has recognized 17 different generic segregates in this complex. It does, nevertheless, seem advisable to divide the species groups into several distinguishable units and to ac-

¹ Some Palearctic and Neotropical species are also included.

² Revision of the Tachinidae of America North of Mexico, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, 1897.

³ The type-species of the North American genera of Diptera. Proc. U. S. Nat. Mus., vol. 37, pp. 499-647, 1910.

⁴ The North American species of parasitic two-winged flies belonging to the genus *Phorocera* and allied genera. Proc. U. S. Nat. Mus., vol. 63, art. 17, 90 pp., 1924.

⁵ Townsend, Manual of myiology, pt. 4, p. 212, 1936.

cord these generic rank. In this revision 6 of the 22 previously created generic names that have been employed for components of the complex treated by Aldrich and Webber under *Zenillia* are retained as valid, and 2 new generic names are proposed.

This group of genera may be characterized as follows: Eyes pilose; ocellar bristles directed forward; frontal bristles descending more or less down on parafacials, at least to base of third antennal segment, one to three uppermost bristles usually reclinate (preverticals); parafrontals pollinose; vibrissae situated at most slightly above oral margin, vibrissal or facial ridges usually bristly on lowest one-third, sometimes extending approximately halfway or slightly more; parafacials bare, at least on lower half; antennae elongate, reaching at least three-fourths way to oral margin, second antennal segment less than half as long as third segment, third antennal segment more than twice as long as wide; arista longer than third antennal segment and not thickened to near the apex, face receding, proboscis well developed and not elongate; palpi of normal length and shape. Chaetotaxy of thorax well developed; anterior acrostichals distinct, one pair just in front of the suture; pteropleural bristle of normal length or weak; posterior sublateral bristle present; middle of propleura hairless.⁶ Wings of normal venation; apical cell open, rarely closed in margin, ending more or less before apex of wing; bristles present only at base of third vein, otherwise the veins bare; posterior cross-vein never more noticeably oblique than apical cross-vein; fourth vein without a distinct fold; last section or fifth vein never half as long as preceding section. Thoracic squamae not hairy; infrasquamal setulae lacking. Abdomen usually black or gray, never metallic blue or green; wider than deep at base; bristly in appearance with at least marginal macrochaetae. Anterior tibiae usually with one or two median posterolateral bristles.

KEY TO THE GENERA

1. Eye high, occupying nearly whole side of head; gena small or nearly linear, not over one-twelfth the eye height (exclusive characteristics).⁷ Usually with only two sternopleural macrochaetae, sometimes three. (Hind tibia ciliate on the anterolateral⁸ side, at least in the male, with regular comblike curved bristles, among which one or two sometimes stand out larger)-----3. *Carcelia* (p. 37)
- Eye not high or occupying whole side of head; gena larger, at least one-eighth or more the eye height; usually more than two sternopleural macrochaetae-----2

⁶ *Aplomya submissa* (Aldrich and Webber) is an exception.

⁷ The term "exclusive characteristics" is used to indicate that the designated part of the key will serve to separate the particular genus or genera from the rest of the genera in the key.

⁸ Anterolateral is the name used for the anterodorsal or outer front side of the tibia; posterolateral, for outer back side of the tibia.

2. Abdomen in both sexes wide and deep, almost globose; fourth segment, unless contracted in drying, closing in a slit above genital opening (exclusive characteristics)----- 1. *Zenillia* (p. 4)
- Abdomen of ordinary form----- 3
3. Front at vertex or narrowest part less than one-third width of head, rarely exceeding 30 percent of head width; front narrower in male than in female, with somewhat diverging margins; claws and pulvilli in male elongated ----- 4
- Front at vertex or narrowest part more than one-third width of head, often two-fifths of head width; front more or less protruding, of equal breadth in both sexes, with almost parallel or little diverging margins; claws and pulvilli small in both sexes (exclusive characteristics)----- 6
4. Scutellum with three pairs of marginal scutellars and an apical pair; hind tibia usually with unequal bristles, sometimes weakly ciliate in certain species ----- 5
- Scutellum with four pairs of marginal scutellars and one strong decussate apical pair (exclusive characteristic). Hind tibia strongly ciliate on anterolateral side in both sexes; with regular, long, comblike, curved bristles, among which one sometimes stands out larger. (Third abdominal segment of male with dense patch of hairs underneath on each side.)----- 5. *Sisyropa* (p. 97)
5. Sternopleural macrochaetae two; antenna with first two segments and basal part of third yellow; frontal bristles descending to middle of second antennal segment; fourth segment of abdomen destitute of macrochaetae; thorax and abdomen wholly golden-pollinose
8. *Angustia*, new genus (p. 107)
- Sternopleural macrochaetae three or four; antenna usually black, at most first and second segments rufous; frontal bristles descending at least to base of third antennal segment; fourth segment usually with either discal or marginal macrochaetae; species predominantly with thorax and abdomen black, gray-pollinose----- 4. *Aplomya* (p. 70)
6. Apical scutellars erect or proclinate, decussate; four postsutural dorsocentral macrochaetae. Male without fronto-orbital bristles----- 7
- Apical scutellars curved backward, decussate; three postsutural dorsocentral macrochaetae; palpi yellow. Male with two fronto-orbital bristles
6. *Thelymyia* (p. 103)
7. Species predominantly gray-pollinose; palpi black----- 2. *Phryxe* (p. 31)
- Species predominantly golden-pollinose; palpi yellow
7. *Chrysophryxe*, new genus (p. 106)

All the forms treated in this key will run to *Zenillia* in Curran's key to the genera of Tachinidae.⁹

This key will eliminate the past practice that made it necessary to cross reference some of the species in certain genera. The use of sexual characters has been restricted. The primary characters cited will place all individuals in their proper genus. Secondary sexual characters have been used only as a supplementary assistance.

⁹ Curran, C. H., The families and genera of North American Diptera, 512 pp., illus., 1934.

1. Genus *ZENILLIA* Robineau-Desvoidy

- Zenillia* ROBINEAU-DESVOIDY, Mém. Acad. Sci. Inst. France, vol. 2, p. 152, 1830; Histoire naturelle des diptères des environs de Paris, vol. 1, p. 471, 1863.—BEZZI and STEIN, Katalog der palaearktischen Dipteren, vol. 3, p. 277, 1907.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, p. 621, 1910.—BAER, Zeitschr. Angew. Ent., vol. 7, p. 118, 1921.—ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 7, 1924.—LUNDBECK, Diptera Danica, pt. 7, p. 337, 1927.—TOWNSEND, Manual of myiology, pt. 4, p. 231, 1936. (Genotype, *Musca libatrix* Panzer. By designation of Robineau-Desvoidy, 1863.)
- Myæxorista* BRAUER and BERGENSTAMM, Denkschr. Akad. Wiss. Wien, math.-nat. Kl., vol. 58, p. 331, 1891; Verh. zool.-bot. Ges. Wien, vol. 43, p. 479, 1893.—TOWNSEND, Manual of myiology, pt. 4, p. 278, 1936. (Genotype, *Musca libatrix* Panzer. By designation of Brauer and Bergenstamm.)
- Hyphantrophaga* TOWNSEND, Psyche, vol. 6, p. 247, 1892; Manual of myiology, pt. 4, p. 249, 1936.—COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 91, 1897. (Genotype, *Meigenia hyphantriacæ* Townsend. By original designation.) (New synonymy.)
- Exorista* OF AUTHORS (nec. Meigen).—COQUILLETT, (partim), U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 91, 1897.—STEIN (partim), Arch. Naturg., Abt. A, Heft. 6, p. 67, 1924.—BARANOFF (partim), Institut Hygiene und Schule Volksgesundheit, Zagreb, Arb. parasit. Abt., No. 3, 1931.
- Eusisyropa* TOWNSEND, Smithsonian Misc. Coll., vol. 51, No. 2, p. 97, 1908; Manual of myiology, pt. 4, p. 245, 1936. (Genotype, *Exorista blanda* Osten Sacken. By original designation.)
- Eucorista* TOWNSEND, Proc. Ent. Soc. Washington, vol. 14, p. 166, 1912; Manual of myiology, pt. 4, p. 249, 1936. (Genotype, *Exorista futilis* Osten Sacken. By original designation.)
- Chrysomasicera* TOWNSEND, Journ. N. Y. Ent. Soc., vol. 23, p. 230, 1915; Manual of myiology, pt. 4, p. 112, 1936. (Genotype, *C. borealis* Townsend. By original designation.)
- Chrysocorista* TOWNSEND, Proc. U. S. Nat. Mus., vol. 49, p. 435, 1915; Manual of myiology, pt. 4, p. 94, 1936. (Genotype, *C. viridis* Townsend. By original designation.)

There exists a difference of opinion concerning the generic limits of *Zenillia*. Stein and Baranoff consider *Zenillia* to be a synonym of *Exorista* of authors. Baer and Lundbeck separate *Zenillia* from *Exorista* of authors, but they are not sure of the limits of these two genera. The only apparent difference between Baer and Lundbeck's *Zenillia* and *Exorista* is that in *Zenillia* the facial ridges are usually considered to have regularly arranged bristles of somewhat equal length above the vibrissae that ascend to near or fully to the middle, whereas in *Exorista* the facial ridges have only a few rapidly decreasing bristles above the vibrissae. The separation of these two genera on the presence or absence of bristles on the facial ridges cannot be attempted with any degree of assurance. The writer is of the opinion that the character is of specific rather than of generic value. As defined in this paper, the majority of the species that Baer and Lundbeck place in *Zenillia* of authors can be referred to *Zenillia* Robineau-Desvoidy, and the majority of species they place in *Exorista*

of authors can be referred to *Aplomya* Robineau-Desvoidy. Townsend has described five genera which cover part of the material that is placed in *Zenillia* in this revision. Townsend places *Zenillia* in the tribe Phrynoiini; *Hyphantrophaga*, *Eusisyropa*, and *Eucxorista* in the tribe Trypherini; *Chrysomasicera* in the tribe Phoroceratini; and *Chrysoexorista* in the tribe Compsilurini.

Eusisyropa of Aldrich and Webber (nec Townsend) approaches more closely to generic concepts than any of the other proposed subgenera in their *Zenillia* complex. While omitting some of the *Eusisyropa* congeners, they have included species that Townsend referred to the genera *Hyphantrophaga*, *Eusisyropa*, and *Eucxorista*.

The characters used to designate the genus *Zenillia* in this paper are as follows: Abdomen in both sexes wide and deep, almost globose; fourth segment, unless contracted in drying, closing in a slit above the genital opening. *Zenillia* can be separated without difficulty from *Phryxæ*, *Carecia*, *Sisyropa*, *Thelymyia*, and *Chrysophryxæ*. A little practice should enable one to differentiate between *Zenillia* and *Aplomya*, but in all cases caution is advised so that mistakes may be avoided. Very few of the Nearctic species of *Zenillia* are bristly on the facial ridges above the lowest one-third.

The following grouping of the species treated in *Zenillia* is suggested for those workers who prefer or insist on restricted genera or a definition of species groups:

1. *libatrix* (*Zenillia*).
2. *futilis* (*Eucxorista*).
3. *angustata*.
4. *hyphantriae*, *euchaetiae*, *desmiae* (*Hyphantrophaga*).
5. *virilis*.
6. *blandita*.
7. *blanda*, *boarmiae*, *tucumanensis*, *autographae* (*Eusisyropa*).
8. *viridis*, *lineata*, *marginata*, *taglinoi*, *facialis*, *darsoni* (*Chrysoexorista*).
9. *ochracea*, *angustifrons*, *fulgoris* (*Chrysomasicera*).

Additional specimens may enable us further to restrict group 8. As no useful taxonomic or bionomic result can be achieved at this time by placing these species groups in restricted genera, the genus *Zenillia* is retained as proposed.

The oviposition habits of some of the *Zenillia* congeners should be mentioned to show a biological relationship in the genus. The Palearctic species *libatrix*, *porcula*, and *pullata*, and the Nearctic species *futilis* and *blanda*, including in all probability the species of the *Eusisyropa* group, belong to Pantel's group 2, characterized by small microtype eggs deposited on plant tissue, where they are consumed by the host along with the tissue. As this type of oviposition is associated with the typical shape of the abdomen cited, our future

knowledge will probably place many of our other species of *Zenillia* in Pantel's group 2.

Most of the species of *Zenillia* possess an inner ventral bristle on the midtibia. It will be noticed that this character, as used in the following key, while usually of specific value, is only a secondary sexual character in some species. The *Hyphantrophaga* and *Eusisyropa* groups have one bristly hair behind on the apex of the hind coxa. *Zenillia fulgoris* has one very fine and *Zenillia virilis* has several fine hairs on the apex of the hind coxa. All the other species of *Zenillia* lack these bristly hairs on the hind coxa.

KEY TO THE SPECIES OF ZENILLIA

There are 21 species of *Zenillia* included in the key. Nine occur in the Nearctic Region, 8 in the Neotropical, and 4 are common to both realms; the genotype *libatrix* is a Palearctic species. Eight of the species are new, and 4 have been removed from synonymy. Since *Zenillia libatrix* has been released in the northeastern part of the United States, it is included in the key, but to date there is no evidence to indicate that the species has become established. *Chrysophryæ tibialis*, new species, is included because the type is labeled as the male allotype of *Chrysocaxorista viridis* Townsend (U.S.N.M. No. 19611), an included species.

1. Midtibia usually with one median anterolateral bristle; if with a smaller additional one, then facial ridge is never bristly on more than lowest one-fourth..... 3
- Midtibia with two or more median anterolateral bristles..... 2
2. Midtibia with two median anterolateral bristles, upper one smaller; palpus yellow, facial ridge bristly to middle..... 1. *libatrix* (Panzer) (p. 8)
- Midtibia with three or more median anterolateral bristles; palpus black; parafacial with a dark-brown reflecting spot just below lowest frontal bristles..... 2. *futilis* (Osten Sacken) (p. 11)
3. Discal macrochaetae present on second and third abdominal segments.... 6
- Discal macrochaetae absent on second and third abdominal segments.... 4
4. Three postsutural dorsocentral macrochaetae; palpus rufous, black toward base, extreme tip yellow; midtibia with one strong median anterolateral bristle and a smaller one below (male only)
 3. *angustata* (Van der Wulp) (p. 12)
- Four postsutural dorsocentral macrochaetae; palpus yellow; midtibia usually with one median anterolateral bristle..... 5
5. Antenna with first and second segments rufous, third black; facial ridge bristly on lowest one-fifth; legs black, tibiae brownish black; abdomen with dorsum completely covered with gray pollen, which extends on to dorsal shoulders of first segment; dorsal vitta indicated at least on second segment..... 4. *euchaetiae*, new species (p. 13)
- Antenna with first and second segments and in female base of third segment yellow, remainder black; facial ridge bristly on more than lowest one-fifth, often nearly halfway; legs reddish brown; abdomen in male with narrow apical margins of segments 2, 3, and 4 brownish black, adjacent pollen

- with a brownish or tawny tinge; marginal pair of macrochaetae on first segment weak----- 5. *hyphantriae* (Townsend) (p. 15)
- Antenna with first and second segments and in female base of third segment yellow, remainder black; facial ridge bristly on more than lowest one-fifth, often nearly halfway; legs black, tibiae brownish (contrasting); abdomen with dorsum of first segment black; segments 2, 3, and 4 completely covered with gray pollen; wing veins dark brown, almost black; marginal pair of macrochaetae on first segment weak---- 6. *desmiae*, new species (p. 16)
6. Normally with three sternopleural macrochaetae¹⁰----- 7
- Normally with two sternopleural macrochaetae and three postsutural dorsocentral macrochaetae¹⁰; females with outer vertical bristle well developed; middle tibia lacking an inner ventral bristle; second segment of antenna black; black, gray-pollinose species; apical scutellars normally turned backward; male abdomen with third and fourth segments shining brown or black on venter, contrasting with pollinose second; inner forceps slender apically, almost straight, ending inwardly at apex with a small tooth, hairy about two-thirds of its entire length-- 7. *virilis* Aldrich and Webber (p. 17)
7. Head, thorax, and abdomen predominantly golden or yellow-pollinose----- 12
- Head, thorax, and abdomen predominantly black, gray-pollinose----- 8
8. Two sternopleural macrochaetae and a sternopleural bristle (rarely indistinguishable from surrounding sternopleural hairs) and four postsutural dorsocentral macrochaetae; apical scutellars normally turned upward. Male abdomen with third and fourth segments pollinose on venter; inner forceps rather thick apically, outwardly with long hair to last fifth, which is bent at an obtuse angle (last fifth in *autographae*, new species, is straight). Male without and female with an inner ventral bristle on midtibia. Female with outer vertical bristle so poorly developed as to appear to be lacking----- 9
- Three strong sternopleural macrochaetae and four postsutural dorsocentral macrochaetae; strong apical scutellars turned backward. Male and female with an inner ventral bristle on midtibia. Female with well-developed outer vertical bristle----- 8. *blandita* (Coquillett) (p. 18)
9. Legs with femur reddish yellow or yellow; second antennal joint red or yellow----- 11
- Legs with femur black and tibia blackish; second antennal joint black or at most obscurely rufous----- 10
10. Frontal orbit silvery white with a faint brassy tinge; abdominal segments gray-pollinose, sometimes lightly tinged with yellow or brown, fourth segment more so but not in striking contrast to intermediate segments
9. *blanda* (Osten Sacken) (p. 19)
- Frontal orbit golden; fourth abdominal segment golden-pollinose in striking contrast to gray of other segments.
10. *tucumanensis*, new species (p. 21)
11. Tarsi and sides of thorax reddish, blending somewhat with yellow color of legs and antennae----- 11. *boarmiae* (Coquillett) (p. 21)
- Tarsi and sides of thorax blacker, yellow of legs and antennae making a sharp contrast----- 12. *autographae*, new species (p. 23)
12. Four postsutural dorsocentral macrochaetae----- 16
- Three postsutural dorsocentral macrochaetae----- 13

¹⁰ The numbers of dorsocentral and sternopleural macrochaetae are known to vary within certain limits in *virilis* and *blanda*; likewise the midtibial, inner ventral bristle in *blanda*.

Erorista libatrix (Panzer) MEIGEN, Systematische Beschreibung der europäischen zweiflügeligen Insecten, vol. 7, pp. 46, 256, 1838.—STEIN, Arch. Naturg., Abt. A, Heft 6, pp. 77-78, 1924.—BARANOFF, Institut für Hygiene und Schule für Volksgesundheit, Zagreb, Arb. parasit. Abt., No. 3, p. 8, 1931.

Myxerorista libatrix (Panzer) BRAUER and BERGENSTAMM, Denkschr. Akad. Wiss. Wien, math.-nat. Kl., vol. 58, p. 333, 1891.

Head with front of male at narrowest 0.25 to 0.27 (in three specimens) and in female 0.29 to 0.31 (in three specimens) of head width; frontal row of seven to eight bristles in male and five to seven in female, extending from on a level with base of third antennal segment to two reclinate preverticals; male with very weak and female with outer vertical bristle; gena one-fifth to one-fourth eye height, silver gray; frontal orbit golden, face silver, and posterior orbit golden on upper portions and silver on lower portions; antenna black, third segment in male more than three times and in female two and three-fourths times second; arista thickened on basal two-fifths, penultimate segment at least as long as broad; palpus yellow, infuscated at base.

Thorax heavy golden-pollinose on dorsal portions, sides more grayish; four mesonotal vittae; four postsutural dorsocentral macrochaetae; scutellum heavy golden-pollinose with three pairs of marginal scutellars and one decussate apical pair turned backward, one pair of discal scutellars; three sternopleural macrochaetae; legs black, a little grayish pruinose; front tibia with two median posterolateral bristles; midtibia with one inner ventral bristle; hind tibia not ciliate; wing tinged with yellow at base and anterior margin; third vein with two or three bristles at base; squamula yellow.

Abdomen completely covered dorsally with heavy golden pollen gradually becoming gray on venter, especially on intermediate segments; dorsal vitta lacking in some lights, obscurely marked in others; first and second segments with a pair and third segment with a row of marginal macrochaetae; second and third segments with a pair of discal macrochaetae often more or less roughly arranged, often with additional bristles and macrochaetae in discal area; fourth segment more or less irregularly covered with bristles, in some specimens discal bristles a little larger and roughly arranged in a row.

Length 6.5 to 8 mm.

Distribution.—The species is widely distributed throughout Europe from England in the west to Russia in the east and from Spain in the south to Finland in the north.

Hosts.—*Porthetria dispar* (Linnaeus), *Stilpnolia salicis* (Linnaeus), *Nygmia phaeorrhoea* (Donovan), *Calocasia coryli* (Linnaeus), *Thaumetopoea processionea* (Linnaeus), *Oxycesta geographica* (Fabricius), and *Pygaera pigra* (Hufnagel). Specimens examined from these hosts were reared at the Central European station formerly maintained at Budapest, Hungary, by the Division of Forest Insect Investiga-

tions, U. S. Bureau of Entomology and Plant Quarantine. Published records: *Abrostola asclepiadis* (Schiffermüller) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck), *Acrionicta auricoma* (Fabricius) (Lundbeck), *Brephos nothum* (Hübner) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck), *Bupalus piniarius* (Linnaeus) (Baer, Eidmann, Lundbeck), *Dasychira pudibunda* (Linnaeus) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck), *Drepana coltraria* (Fabricius) (Wainwright), *Nygmia phaeorrhaca* (Donovan) (= *Eurproctis chrysorrhoea* [auct. not (Linnaeus)]) (Baer, Lundbeck, Dowden), *Larentia autumnalis* (Ström) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck), *Liparis monacha* (Linnaeus) (Baer), *Leaostegia sticticalis* (Linnaeus) (Mamonov), *Porthetria dispar* (Linnaeus) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck, Dowden), *Malacosoma neustria* (Linnaeus) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck), *Orycesta geographica* (Fabricius) (Dowden), *Phlyctanodes verticalis* (Linnaeus) (Baer, Lundbeck), *Porthesia similis* (Fuessly) (Baer, Lundbeck), *Pygaera anachoreta* (Fabricius) (Baer, Lundbeck), *P. pigra* (Hufnagel) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck, Dowden), *Salebria marmorata* (Alphéraky) (Pustovoit), *Stilpnotia salicis* (Linnaeus) (Brown, Dowden), *Sylepta ruralis* (Scopoli) (Baer, Lundbeck), *Thaumetopoea processionea* (Linnaeus) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck), *Hyponomeuta cognatella* (Hübner) (Lundbeck), *H. eronymella* (Linnaeus) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck), *H. padella* (Linnaeus) (Bezzi and Stein, Howard and Fiske, Baer, Lundbeck), *H. rorella* (Hübner) (Baer, Lundbeck). Dowden records it on laboratory-attacked material at Budapest, Hungary, as hibernating in *Orycesta geographica*, *Calocasia coryli*, and *Acrionicta rumicis* (Linnaeus); as reared on laboratory-attacked material at Melrose, Mass., on *Bombyx mori* (Linnaeus), *Euchaetias egle* (Drury), and *Melalopha inclusa* Hübner (Farquhar and Seeley), and hibernating in *M. inclusa* (Dowden).

Remarks.—The foregoing description is based on an examination of a considerable number of European reared specimens mostly from *Porthetria dispar*. Various European specialists comment on the species as varying in color, sometimes being quite grayish. Specimens examined that were reared from *Orycesta geographica* and *Pygaera pigra* appeared to be a deeper, duller, golden-brown and more hairy or bristly. In the specimens from *O. geographica* there was a group of irregularly placed discal macrochaetae on the third segment.

Zenillia libatrix has been liberated as a parasite of the gypsy moth in the northeastern part of the United States, but there is no evidence indicating that the species has become established.

Adults, May to September; number per host, one to several; generations, one, two, or more; hibernation, as larva in host pupa.

2. *ZENILLIA FUTILIS* (Osten Sacken)

Exorista futilis OSTEN SACKEN, Can. Ent., vol. 19, p. 161, 1887.—WILLISTON, Scudder's Butterflies of Eastern United States and Canada, vol. 3, p. 1917, pl. 89, fig. 10, 1889.—COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 98, 1897.—SMITH, Catalogue of New Jersey insects, p. 780, 1909.—GIBSON, Ann. Rep. Ent. Soc. Ontario, 1912, p. 133.—TOTHILL, Can. Ent., vol. 45, p. 71, 1913.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, p. 32, pl. 19, fig. 93 (puparium), 1922.

Eucrorista futilis (Osten Sacken) TOWNSEND, Proc. Ent. Soc. Washington, vol. 14, p. 166, 1912; Manual of myiology, pt. 4, p. 249, 1936.

Zenillia futilis (Osten Sacken) ALDRICH and WEBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 42, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925; Proc. Boston Soc. Nat. Hist., vol. 38, p. 87, 1925.—ESSIG, Insects of western North America, p. 581, 1926.—LEARNED, Bull. Brooklyn Ent. Soc., vol. 22, p. 219, 1927.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—ALDRICH, Proc. U. S. Nat. Mus., vol. 80, art. 20, p. 3, 1932.—SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 112, 1934.

Head with front of male at narrowest 0.29 to 0.30 (in five specimens) and of female 0.31 to 0.33 (in five specimens) of head width; frontal row of seven to nine bristles, rarely six in some females, extending from on a level with insertion of arista to two reclinate upper frontals (preverticals); facial ridge bristly on lowest one-fourth; gena one-sixth eye height; frontal orbit and parafacial golden or yellow-pollinose; antenna black, third segment in the male three and one-third and in the female two and two-thirds times second; arista thickened on basal one-fourth, penultimate segment short.

Thorax black, gray-pollinose marked with five mesonotal vittae; four postsutural dorsocentral macrochaetae; scutellum black with three pairs of marginal scutellars and one decussate apical pair turned backward, one pair of discal scutellars; three sternopleural macrochaetae; midtibia with three median anterolateral bristles, sometimes more in female, one inner ventral bristle; hind tibia more or less ciliate with two longer bristles.

Abdomen black, gray-pollinose, fourth segment golden; first and second segments with pair, third and fourth with a row of marginal macrochaetae; row of discal macrochaetae on fourth segment only; abdominal dorsal vitta obscurely marked.

Hypopygium black, gray-pollinose, inner and outer forceps of equal length; the inner curving slightly inward, shining black, and densely clothed with long fine hairs; the outer very slender and tapering to a fine point.

Length 6.5 to 11 mm.

*Distribution*¹¹.—Maine 3, New Hampshire 1, Vermont 2, Massachu-

¹¹ Under "Distribution" the numbers following the names of the States indicate the number of localities from which specimens have been examined. In the case of published records, they indicate the number of localities mentioned in addition to those from which specimens were examined. The use of the numbers enables one to visualize the centers of distribution as well as the fringes of the areas involved.

setts 18, Connecticut 2, New York 2, New Jersey 4, Indiana 1, Idaho 1, South Dakota 1, Wisconsin 1, Oregon 2, Washington 1. Published and unpublished records not duplicated above: Massachusetts 1 (Aldrich); Connecticut (Britton); New York 13 (West), 1 (Coquillett); New Jersey 2 (Smith), 1 (Weiss); Pennsylvania (Schaffner and Griswold); North Carolina (Brimley); Illinois (Coquillett); California (Coquillett, Essig); Quebec (Winn and Beaulieu); Ontario (Gibson, Tothill, and Winn and Beaulieu); British Columbia (Currie).

Type.—Museum of Comparative Zoology, Cambridge, Mass.

Hosts.¹²—*Vanessa atalanta* (Linnaeus) 303, *Ennomos subsignarius* (Hübner) 142, *Malacosoma americana* (Fabricius) 9, *Vanessa* spp. 7, *Malacosoma disstria* Hübner 2, *Euchaetias egle* (Drury) 2, *Nymphalis milberti* (Godart) 2, *Sarothripus rocanus* (Scopoli) 1, *Nephelodes emmedonia* (Cramer) 1, *Pyrastia nubilalis* (Hübner) 1, *Septis apamiformis* (Guénée) 1. Published records not duplicated in the above records: *Vanessa atalanta* (Linnaeus) (Harris and Scudder, Johnson), *Vanessa cardui* (Linnaeus) (Schaffner and Griswold), *Malacosoma disstria crosa* form *thoracica* Stretch (Koebele), *M. disstria* (Lintner), *M. americana* (Liu), *Isia isabella* (Abbott and Smith) (Tothill), *Autographa californica* (Speyer) (Essig), *Apantesis phalerata* (Harris) (Learned).

Remarks.—The foregoing description was based on an examination of the following material: 463 reared specimens bearing Gypsy Moth Laboratory note numbers; 1 male from the Riley collection reared from *Vanessa atalanta* (Sprague); 1 male reared from *Pyrastia nubilalis* (Craig); 1 male reared from *Septis apamiformis*, May 16, 1884; 1 male and 3 females reared from *V. atalanta*, Nos. 1181, 1181u, and 1181y (Dimmock); 5 specimens bearing note numbers as follows: 1 male and 1 female 414° (Koebele), 1 female 568° (Koebele), 1 female 1936 (August 13), 1 female 1936 (2) 2341 (September 17); 5 males and 8 females (Riley, Walton, Gabrielson, Aldrich, Furniss, and Fluke); and 55 additional miscellaneous collected specimens from the Gypsy Moth Laboratory.

Adults, May to September; number per host, one or two; generations two or more; hibernation, larva in host pupa. Townsend pointed out that *Zenillia futilis* lays microtype eggs on foliage, which are swallowed by its hosts.

3. ZENILLIA ANGUSTATA (Van der Wulp), new combination

Erorista angustata VAN DER WULP, Biologia Centrali-Americana, Diptera, vol. 2.

p. 70, 1890.—COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 99, 1897.

Zenillia coquillettii ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 11, 18, 1924. (New synonymy.)

¹² Under "Hosts" the numbers following the names of the hosts indicate the number of specimens examined which were reared from that particular host.

Head with front of male 0.32 head width; frontal row of eight bristles, extending from on a level with base of third antennal segment to two reclinate preverticals; strong outer vertical bristle; facial ridge bristly on lowest one-fourth; gena one-fourth eye height; frontal orbit and face silvery pollinose; antenna black, third segment four times the length of second; arista thickened on the basal one-third, penultimate segment short.

Thorax black, gray-pollinose marked with four mesonotal vittae; scutellum black, gray-pollinose with three pairs of marginal scutellars and one nondecussate apical pair; three sternopleural macrochaetae; midtibia with one inner ventral bristle; hind tibia not ciliate.

Abdomen black, silvery gray-pollinose; first segment, second and third segments at apex, and fourth segment except at the sides shining black; first and second segments with a pair and third segment with an encircling row of marginal macrochaetae; fourth segment with irregular bristles mostly on apical half.

Length 10 mm.

Type locality.—Chilpancingo, Mexico.

Distribution.—Texas 1, Mexico 1.

Type.—Male, British Museum. Type of *coquilletti*, male, U.S.N.M. No. 25702.

Host.—Unknown.

Remarks.—The writer had the privilege of examining the type series of *Exorista angustata* in the British Museum. The description was based on an examination of the type of *angustata* and the type of *coquilletti*. The type of *angustata* had a pair of strong outer vertical bristles; the palpi were strongly infuscated at the base with the tip lighter.

4. ZENILLIA EUCHAETIAE, new species

Zenillia ceratoniae (Coquillett) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 41, 1924.

Zenillia ecratoniae SCHAEFFNER and GRISWOLD (nec Coquillett), U. S. Dept. Agr. Misc. Publ. 188, p. 111, 1934.

Male (type).—Head with front at narrowest 0.27 head width; frontal row of nine bristles, extending from on a level with base of third antennal segment to two reclinate preverticals; facial ridge bristly on the lowest one-fifth; gena one-sixth eye height; parafrontal and face silvery white-pollinose; antenna with first and second segments rufous, third black, third segment four and one-half times length of second; arista thickened on basal one-fourth, penultimate segment short.

Thorax black covered with heavy gray pollen marked with four mesonotal vittae; scutellum black heavily covered with gray pollen, with three pairs of marginal scutellars and one small decussate apical

pair turned up, one pair of discal scutellars; three sternopleural macrochaetae; legs black with tibiae brownish black; midtibia with one median anterolateral bristle and one very small one above it; hind tibia subciliate; wing grayish hyaline, third vein with two to three bristles at the base.

Abdomen black, dorsum of all segments including the first completely covered with heavy gray pollen; indication of dorsal vitta on second and third segments; abdominal hairs depressed; first and second segments with a pair, and third with a row of marginal macrochaetae; fourth segment with a row of discal macrochaetae, tipped with marginal bristles.

Length 9 mm.

Female (allotype).—Front at narrowest 0.30 head width; six frontal bristles; third segment of antenna four times second; two fronto-orbital bristles. Midtibia with one median anterolateral bristle and a smaller one above; pulvilli small. Abdomen heavily covered with gray pollen; dorsal vitta indicated on second segment only; fourth segment with a row of discal and marginal macrochaetae. Otherwise the description is the same as for the male.

Length 9 mm.

Other specimens vary as follows: Front of male 0.28 to 0.29 and of female 0.30 to 0.32; 7 to 10 frontal bristles in male and 5 to 6 in female; third segment of antenna in female three and one-half times second. Mid tibia usually but not always with 1 small bristle above the 1 strong median anterolateral bristle. Dorsal vitta obscurely marked.

Length 7 to 9 mm.

Type locality.—Clayton, N. Y.

Distribution.—Massachusetts 4, New York 2, New Jersey 4, Pennsylvania 1, Maryland 1.

Type.—Male, U.S.N.M. No. 54174.

Hosts.—*Euchaetias egle* (Drury) 37, *Cyenia tenera* (Hübner) 42, *Pyrausta futilalis* (Lederer) 11, *Cyenia inopinata* (Henry Edwards) 2.

Remarks.—The material examined consisted of reared specimens bearing Gypsy Moth Laboratory note numbers as follows: Type and one female paratype reared from *Euchaetias egle*, No. 12130L10; one male paratype reared from *E. egle*, Adams, N. Y., No. 12130M7; one female paratype reared from *E. egle*, North Branch, N. J., No. 11741M9; allotype, three male paratypes, and one female paratype reared from *Cyenia tenera*, Somerville, N. J., No. 11779H3; one female paratype reared from *C. tenera*, Somerville, N. J., No. 11779H2; 82 additional reared specimens; and one male, Plummers Island, Md. (Shannon).

Adults, June to September; number per host, one, sometimes two; generations, one or two; hibernation, in host pupa.

5. *ZENILLIA HYPHANTRIAE* (Townsend), new combination

Meigenia hyphantriae TOWNSEND, Psyche, vol. 6, p. 176, 1891.

Hyphantrophaga hyphantriae (TOWNSEND) TOWNSEND, Psyche, vol. 6, pp. 247-248, 1892; Manual of myiology, pt. 4, p. 249, 1936.—GILLETTE, Trans. Amer. Ent. Soc., vol. 22, p. 75, 1895.—BAKER, Ent. News, vol. 6, p. 174, 1895.—COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, pp. 17, 91, 1897; Proc. U. S. Nat. Mus., vol. 37, p. 554, 1910.—GREENE, Proc. U. S. Nat. Mus. vol. 60, art. 10, p. 17, pl. 6, fig. 26 (puparium), 1922.—ESSIG, Insects of Western North America, p. 580, 1926.

Exorista ceratoniae COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, pp. 13, 101, 1897.—REINHARD, Ent. News, vol. 32, p. 72, 1921.—LUGINBILL, U. S. Dept. Agr. Tech. Bull. 34, p. 81, 1928. (New synonymy.)

Zenillia ceratoniae (Coquillett) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 41, 1924.

Didyma exigua LEIBY (*nec* Van der Wulp) North Carolina Dept. Agr. Bull., Feb. 1925, p. 18.

Head with front of male at narrowest 0.27 to 0.30 and of female 0.32 to 0.33 of head width; frontal row of six to eight bristles in male and six to seven in female, extending from on a level with base of third antennal segment to two reclinate preverticals; facial ridge bristly on lowest one-third to two-fifths; gena one-sixth eye height; parafrontal and face silvery white pollinose; antenna with third segment in male four and in female three and one-half times length of second; arista thickened on basal one-fourth, penultimate segment short.

Thorax black, gray-pollinose marked with four mesonotal vittae; scutellum black, heavily covered with gray pollen, with three pairs of marginal scutellars and one very small decussate apical pair turned up, one pair of discal scutellars; three sternopleural macrochaetae; legs reddish brown; midtibia with one median anterolateral bristle, one inner ventral bristle; hind tibia subeiliate; wing grayish hyaline, third vein with two to three bristles at the base.

Abdomen black, heavily covered with gray pollen, last three segments wholly gray-pollinose in female: first segment with a weak or vestigial pair, second with a pair, and third with a row of marginal macrochaetae; fourth segment with a row of discal macrochaetae, tipped with marginal macrochaetae in female and marginal bristles in male.

Length 5.5 to 8 mm.

Type locality.—Las Cruces, N. Mex.

Distribution.—New Mexico 1, Texas 5, Oklahoma 1, Missouri 2, Kansas 1, Florida 1. Published and unpublished records not duplicated above: North Carolina (Leiby), Tennessee (Luginbill), Mis-

souri (Coquillett), Texas (Reinhard), Colorado (Baker, Aldrich, and Webber), Arizona (Coquillett).

Type.—Female, U.S.N.M. No. 889. *Exorista ceratomiæ* Coquillett, male, U.S.N.M. No. 3601.

Hosts.—*Hyphantria cunea* (Drury) 1, *Pempelia* sp. 2, *Omphalocera cariosa* Lederer 1, *Lorostege similalis* (Guénée) 2, *Lagoa crispata* Packard, *Laphygma frugiperda* (Abbott and Smith) 1, *Lygris diversilineata* Hübner 1, pyralid 1. Published records not duplicated above: *Lorostege similalis* (Reinhard), *Laphygma frugiperda* (Luginbill), *Eucateris variaria* Grote (Townsend), *Nymphalis milberti* (Godart) (Baker, Gillette), *Ceratonia undulosa* (Walker) (Riley), *Gloveria howardi* (Dyar) (Coquillett), *Acrobasis caryæ* Grote (Leiby).

Remarks.—The foregoing description was based on an examination of the following material: Type female reared from *H. cunea*, September 1; type and one male paratype of *Exorista ceratomiæ* reared from *Pempelia* sp., Fort Worth, Tex., 4357° (Allison); one male paratype reared from *Omphalocera cariosa*, Oswego, Kans., July 2, 1892, 454L° (Newlon); one female paratype reared from pyralid, Cadet, Mo., September, 1890, 4730° (Barlow); one male reared from *Lorostege similalis*, Victoria, Tex. (Quaintance); one male reared from *L. similalis*, Waurika, Okla. (Kelly); one female reared from *Lagoa crispata*, McMecklin, Fla., February 25, 1889, 432°; one male reared from *Lygris diversilineata*, Chillicothe, Tex., September 24, 1909, Webster No. 6015 (Greene's type drawing); collected specimens consisting of seven males and four females (Reinhard, Townsend, and Tucker).

6. ZENILLIA DESMIAE, new species

This species resembles *Zenillia hyphantriae* (Townsend) in most respects.

Male (type).—Front 0.28 head width; frontal row of seven or eight bristles; facial ridge bristly on the lowest two-fifths; third segment or antenna five times length of second; arista thickened on basal one-sixth.

Legs black with tibiae brownish (contrasting); midtibia with one median anterolateral bristle; veins of wing dark brown, almost black.

Abdomen black heavily covered with gray pollen; dorsum of first segment shining black, not pollinose; the other three segments completely pollinose; first segment with a weak or vestigial pair of macrochaetae. Otherwise the description is much the same as for *Zenillia hyphantriae*.

Length 7 mm.

Female (allotype).—Front 0.31; six and nine frontal bristles; third segment of antenna three times second; facial ridge bristly on the lowest one-third. Midtibia with one small bristle above the one strong median anterolateral bristle. Pollen of the abdomen with a tawny tinge.

The two male paratypes differ but slightly from the type; front 0.26 and 0.27; frontal bristles seven to nine in number; in one, facial ridge bristly only one-third; third segment of antenna four and one-half times the second.

Length 7 mm.

Type locality.—Exeter, Calif.

Type.—Male, U.S.N.M. No. 54133.

Host.—*Desmia funeralis* Hübner 4.

Remarks.—Material examined consisted of four specimens reared from *Desmia funeralis* pupa; type and one male paratype, October 4, 1936; allotype and one male paratype, October 23, 1936.

7. ZENILLIA VIRILIS Aldrich and Webber

Exorista blanda of COQUILLETT (nec Osten Sacken), U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 92, p. 13 (partim), 1897.—HOWARD and FISKE, U. S. Dept. Agr., Bur. Ent., Bull. 91, pp. 90, 140–142, 1911.

Eusisyropa blanda of SMITH (nec Osten Sacken), Catalogue of New Jersey insects, p. 779, 1909.

Zenillia blanda virilis ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 37–40, 1924.—JOHNSON, List of New England Diptera p. 197, 1925.

Zenillia virilis Aldrich and Webber, SELLERS, Ann. Ent. Soc. Amer., vol. 23, pp. 569–576, 1930.—SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 113, 1934.

Coquillett considered this species to be *Exorista blanda* Osten Sacken. Aldrich and Webber were only able to separate the males of *Zenillia blanda* and *Z. virilis*. The identity of the two species was discussed by the writer in the Annals of the Entomological Society of America in 1930.

Type locality.—Rye, N. Y.

Distribution.—Maine 9, New Hampshire 2, Massachusetts 9, Connecticut 4, Rhode Island 1, New York 3, New Jersey 6, Pennsylvania 1, Maryland 2, Virginia 2, Illinois 1, Kansas 1, Colorado 1, New Mexico 2, Mexico 3. Published records not duplicated above: Massachusetts 3 (Howard and Fiske), New Hampshire (Coquillett), Pennsylvania (Coquillett).

Type.—Male, U.S.N.M. No. 25698.

Hosts.—*Papaipema harrisii* (Grote) 1, *Ennomos subsignarius* (Hübner) 1, *Porthetria dispar* (Linnaeus) 8, *Danaus plexippus* (Linnaeus) 1, *Simyra heurici* (Grote) 1, *Acronicta dactylina* (Grote) 1, *A. impressa* Walker 3, *A. grisea* Walker 1, *A. leporina vulpina*

(Grote) 17, *Callosamia promethea* (Drury) 5, *Ceratonia catalpae* (Boisduval) 3, *Anacamptodes ephyraria* (Walker) 1, *Gluphisia septentrionalis* Walker 5, *Polia legitima* (Grote) 1, *Ichthyura albosigma* (Fitch) 1, *Ichthyura strigosa* Grote 1, *Phigalia titea* (Cramer) 2, *Cingilia catenaria* (Drury) 15, *Proctides clarus* (Cramer) 1, *Phosphila turbulenta* Hübner 2, *Hyphantria cunea* (Drury) 2, *Vanessa atalanta* (Linnaeus) 1. Published and unpublished records not duplicated above: *Euclea delphini* Boisduval as *cippus* Cramer (Coquillett); *Orthetria dispar* (Howard and Fiske); *Polygonia interrogationis* (Fabricius), *Platysamia cecropia* (Linnaeus), *Acrionicta oblinita* Abbott and Smith (Schaffner and Griswold).

Remarks.—The material examined consisted of the male type reared from *Papaipema harrisii* (Bird); 4 male paratypes bearing Gypsy Moth Laboratory numbers—ex *E. subsignarius* No. 10029, ex *C. catenaria* No. 12418 F5, ex *P. dispar* No. 4365C, and *Danaus pleippus* No. 5904; 1 male paratype, Lawrence, Kans. (Aldrich); 1 male paratype, Dist. Federal Mexico (Conrad); 57 reared specimens bearing Gypsy Moth Laboratory numbers; 3 males and 7 females reared from *Cingilia catenaria* (Dimmock, No. 934); 1 female ex unknown host, Arendtsville, Pa. (Frost); collected specimens, 4 males and 18 females (Aldrich, Shannon, Smyth, Barber, Coquillett, Townsend, Tucker).

The male type had one very weak inner ventral bristle on the midtibia.

Adults, June to September; number per host, one to five; generations, one or two; hibernation, as larva in host pupa.

8. ZENILLIA BLANDITA (Coquillett)

Errorista blandita COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 96, 1897.

Zenillia blandita (Coquillett) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 40–41, 1924.—JOHNSON, List of New England Diptera, p. 197, 1925.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—SELLERS, Ann. Ent. Soc. Amer., vol. 23, pp. 569–576, 1930.

The status of this species was discussed by the writer in the Annals of the Entomological Society of America in 1930.

Type locality.—Franconia, N. H.

Distribution.—New Hampshire 1, Massachusetts 2, District of Columbia. Published records not duplicated above: Rhode Island (Johnson), New York (West), District of Columbia (Aldrich and Webber).

Type.—Female, U.S.N.M. No. 3592.

Hosts.—Published record: Aldrich and Webber list *Sarothrips revayanus* (Scopoli) (Walton MS.).

9. ZENILLIA BLANDA (Osten Sacken)

- Exorista blanda* OSTEN SACKEN, Can. Ent., vol. 19, pp. 162-163, 1887.—WILLISTON, Scudder's Butterflies of Eastern United States and Canada, vol. 3, p. 1918, pl. 89, fig. 11, 1889.
- Exorista blanda proserpina* WILLISTON, Scudder's Butterflies of Eastern United States and Canada, vol. 3, p. 1919, 1889.
- Exorista boarmiae* COQUILLETT (partim), U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, pp. 13, 95, 1897.
- Eusisyropa blanda* (Osten Sacken) TOWNSEND, Smithsonian Misc. Coll., vol. 51, No. 2, p. 97, 1908; U. S. Dept. Agr. Bur. Ent., Tech. Bull. 12, pt. 6, p. 116, 1908; Manual of myiology, pt. 4, p. 245, 1936.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, p. 543, 1910.
- Eusisyropa boarmiae* of SMITH (nec Coquillett), Catalogue of New Jersey insects, p. 780, 1909.
- Exorista boarmiae* of HOWARD and FISKE (nec Coquillett), U. S. Dept. Agr., Bur. Ent., Bull. 91, pp. 93, 145, 147-149, 1911.
- Zenillia blanda* (Osten Sacken) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 37-40, 1924.—BOTTIMER, Journ. Agr. Res., vol. 33, pp. 800, 814, 1926.—ESSIG (partim), Insects of western North America, p. 581, 1926.—BURGESS and CROSSMAN, U. S. Dept. Agr. Dept. Bull. 1469, p. 14, 1927.—JOHNSON, Biological survey of Mount Desert region, insect fauna, pt. 1, p. 201, 1927.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—SELLERS, Ann. Ent. Soc. Amer., vol. 23, pp. 569-576, 1930.—ALDRICH, Proc. U. S. Nat. Mus., vol. 80, art. 20, p. 2, 1932.—SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 111, 1934.
- Zenillia blanda blanda* (Osten Sacken) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 37-40, 1924.

In 1930, when the identity of *Zenillia blanda* (Osten Sacken) was explained, the writer had not seen the type material of *Exorista boarmiae* Coquillett. An examination showed that the original material, other than the type specimen *boarmiae*, included some specimens of *Exorista blanda* Osten Sacken. As explained, *Exorista blanda* of Coquillett (nec Osten Sacken) equals *Zenillia virilis* Aldrich and Webber.

The recognition of *boarmiae* Coquillett as a valid species creates a certain amount of confusion in the bibliography of the species *blanda* and *boarmiae* that is unavoidable.

Type locality.—Unknown.

Distribution.—Maine 9, New Hampshire 3, Massachusetts 40, Rhode Island 11, Connecticut 2, New York 7, New Jersey 11, Pennsylvania 2, Texas 1, Arizona 2, Peru 2, Bolivia 1. Published records not duplicated above: New York 4 (West), New Jersey 4 (Smith), British Columbia (Hines). Questionable records: Texas (Bottimer), Colorado (Aldrich and Webber).

Type.—Museum of Comparative Zoology, Cambridge, Massachusetts.

Hosts.—*Vanessa cardui* (Linnaeus) 1, *Erynnis brizo* (Boisduval and LeConte) 1, *Isturgia truncataria* (Walker) (Coquillett listed as

Boarmia pampinaria) 1, *Archips cerasivorana* (Fitch) 101, *A. fereidana* (Clemens) 219, *Catocala* sp. 1, *Ennomos subsignarius* (Hübner) 4, *Calocalpe undulata* (Linnaeus) 9, *Notolophus antiqua* (Linnaeus) 1, *Nygmia phacorrhoea* (Donovan) 1, *Sphocodina abbottii* Swainson) 1, *Thyridopteryx ephemeraeformis* (Haworth) 1, tortricid on sumac 2, *Cingilia catenaria* (Drury) 37, *Proteides clarus* (Cramer) 2, *Phosphila turbulenta* Hübner 9, *Hyphantria cunea* (Drury) 12, *Vanessa atalanta* (Linnaeus) 2, *Depressaria heracliana* (Linnaeus) 1, *Acrobasis comptoniella* Hulst 1, larva on *Comptonia peregrina* (Linnaeus) Coultier (*Myrica asplenifolia* Linnaeus) 1, oakworm 1, gelechiid webber on willow 2. Published records not duplicated above: *Archips argyrospila* (Walker) (Gill), *Stilpnotia salicis* (Linnaeus) (Burgess and Crossman), tortricid on poplar (Sellers), *Archips fereidana* (Clemens) (Smith), *Polygonia interrogationis* (Fabricius) (Schaffner and Griswold), *Smerinthus geminatus* (Say) (Schaffner and Griswold). Records questionably referred here: *Gretchena bolliana* (Slingerland) (Gill), *Anomis crosa* Hübner (Bottimer), *Filatima monotaeniella* (Bottimer).

Remarks.—The material examined consisted of the male type reared from *Vanessa cardui*; the male type of the var. *proserpina* Williston, reared from *Erynnis brizo*; the female reared from *Isturgia truncataria* and erroneously selected by Aldrich and Webber as the type of *boarmiae* Coquillett; 401 reared specimens bearing Gypsy Moth Laboratory numbers; one female reared from *Cingilia catenaria* (Dimmock No. 934); one female reared from larva on *Comptonia peregrina* (Linnaeus) Coultier (*Myrica asplenifolia* Linnaeus) (Dimmock No. 992); one female reared from oakworm (Scammell); one male and one female reared from *Ennomos subsignarius* (Knull); 2 females reared from gelechiid webber on willow (Brower); one male, Center Harbor, N. H. (Dyar: reared from *Acrobasis comptoniella*); collected specimens, five males and eight females (Townsend, Mann, Riley, and Dyar).

Concerning the puparia: Greene stated that in his specimen of *Exorista boarmiae* the second spiracular entrance from the bottom is rather long. In the *Zenillia blanda* puparia studied in 1930, this entrance did not seem to be constantly longer than the one immediately above it; the spiracular entrances were simpler and less convoluted.

Adults, June to October; number per host, usually one; generations, one or two; hibernation, as larva in host pupa. An interesting observation that indicated the limiting factor controlling the number of generations per year for this species and *Zenillia virilis* was as follows: If parasitic on hosts producing adults the same season, the parasites completed their development that season; but if para-

sitic on hosts that pass the winter in the pupal stage and emerge the following spring or summer, the flies did not emerge until the following spring.

10. *ZENILLIA TUCUMANENSIS*, new species

This species is similar to *Zenillia blanda*, but the characters given in the key, frontal orbit brassy or golden and fourth segment golden pollinose, will serve to separate it readily. The ratio of the front of the male at the narrowest point in relation to the head width is greater than in *blanda* (0.21–0.23) or *boarmiae* (0.20–0.22); this is not so noticeable in the females.

Male (type).—Head with front at narrowest 0.26 head width; frontal row of six bristles, extending from on a level with base of third antennal segment to two reclinate preverticals; facial ridge bristly on lowest one-sixth; gena one-seventh eye height; frontal orbit brassy or golden-pollinose; antenna black, third segment four and one-half times second. Abdomen with fourth segment golden pollinose contrasting with gray of other segments.

Female (allotype).—Front 0.28 head width; five frontal bristles; third segment of the antenna three and three-fourths times second. Otherwise the description is the same as for the male.

The paratype material varies as follows from the descriptions above: Female with front 0.28 to 0.30; male and female with five or six frontal bristles; third antennal segment in male four and one-fourth to four and one-half, in female three and one-half to three and three-fourths, times second.

Type locality.—Tucuman, Argentina.

Type.—Male, U.S.N.M. No. 54134.

Host.—Unknown.

Remarks.—The description is based on an examination of the type, allotype, two male paratypes, and three female paratypes reared from an unknown host, Tucuman, Argentina, Est. Exp. A. C. No. 310 (Rust). The material issued from April 12–30, 1917.

The bottom spiracular entrances of the stigmal plates of the puparia are a little more convoluted than in *blanda*.

11. *ZENILLIA BOARMIAE* (Coquillett), new combination

Exorista boarmiae COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 95, 1897.—CHITTENDEN, U. S. Dept. Agr., Div. Ent., Bull. 66, p. 26, 1910.—SHERMAN, Journ. Econ. Ent., vol. 13, p. 295, 1920.—BRIMLEY, Ent. News, vol. 33, p. 22, 1922.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, p. 16, pl. 6, fig. 25 (puparium), 1922.—LEIBY, North Carolina Dept. Agr. Bull., Feb. 1925, p. 9.—SELLERS, Ann. Ent. Soc. Amer., vol. 23, pp. 569–576, 1930.

Exorista hypenae Coquillett MS., HOWARD, U. S. Dept. Agr. Bur. Ent., Bull. 7, n. s., p. 47, 1897.—HAWLEY, Cornell Univ. Agr. Exp. Stat., Mem. 15, p. 196, 1918.

- Eusisyropa boarmiae* (Coquillett) TOWNSEND, Smithsonian Misc. Coll., vol. 51, No. 2, p. 98, 1908.
- Zenillia blanda blanda* (Osten Sacken) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 37-40, 1924.
- Exorista blanda* of HILL (nec Osten Sacken), U. S. Dept. Agr. Dept., Bull. 1336, pp. 17, 18, 1925.
- Zenillia blanda* of ESSIG (nec Osten Sacken), Insects of western North America, p. 581, 1926.

Coquillett placed the type label of *Exorista boarmiae* on the specimen labeled "No. 468 L^o Nov. 14, 82." When Townsend discussed the genus *Eusisyropa* in 1908, his designation of this specimen as being the type makes it in any case the lectotype of *boarmiae*. In 1924 Aldrich and Webber wrote, "(This specimen was erroneously labeled as type of *boarmiae*, but was not originally included)." Coquillett originally included four males and three females, and Aldrich and Webber did not present any evidence to prove that the above labeled female reared from *Alabama argillacea* (Hübner) was not one of the three original females. They changed the type label to a specimen that had been reared from *Isturgia truncataria* (Walker) saying "Coquillett (Revis., p. 13), erroneously gives the host as *Boarmiae pampinaria*, from which he named the supposed new species *boarmiae*. Obviously this specimen should be the type of *boarmiae*, and we have so labeled it." The female which they labeled as the type of *Exorista boarmiae* is *Zenillia blanda* Osten Sacken. Under any circumstances the transfer of the type label to this specimen is untenable. Similar instances indicate that Coquillett based his names not necessarily on the host rearing from which he selected the type specimen, but on the name of the host from which his records indicated that it was first reared.

Type locality.—Mississippi.

Distribution.—Mississippi 1, Arkansas 1, Florida 2. Published and unpublished records not duplicated above. North Carolina (Brimley, Loiby), District of Columbia (Coquillett), Texas (Aldrich's notes). Coquillett's record of Boston, Mass., refers to *Zenillia blanda*.

Type.—Female, U.S.N.M. No. 3591.

Hosts.—*Alabama argillacea* (Hübner) 1, *Hyppena humuli* (Harris) 1, *Loxostege similalis* Guénéé, *Plathypena scabra* (Fabricius) 1, *Dichogama redtenbacheri* Lederer 3, *Hyphantria cunea* (Drury) 1. Published records probably not duplicated above: *Plathypena scabra* (Fabricius) (Chittenden, Sherman, Hill). Records questionably referred here: *Acrobasis juglandis* (Le Baron) (Brimley); green clover worm pupae (Brimley); *Acrobasis* sp. (Fabis) (Aldrich's notes).

Remarks.—The material examined consisted of the female type reared from *Alabama argillacea*; two males reared from *Loxostege*

similalis, one of which has a paratype label (Avera, 439 L^o 1); one male reared from *Hyppena humuli*, No. 185^o (*Exorista hyppenae* Coquillett Ms.); one female 359^o Form a, June 1, 1875; one female reared from *H. texator*, 78^o 3, April 19, 1887; one female reared from *Plathypena scabra*, U. S. D. A. Ent. No. 38; two males and one female reared from *Dichogama redtenbacheri*, L^o (Dyar); one male and one female, Gainesville, Fla. (J. R. W.).

The puparium has been featured by Greene. The differences from *Zenillia blanda* were discussed under *blanda*.

12. ZENILLIA AUTOGRAPHAE, new species

Zenillia blanda blanda (Osten Sacken) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 37-40, 1924.

This species is similar to *Zenillia boarmiæ*, but it is distinctively yellower. The male genitalia are the same as in *Zenillia blanda* but with the tip of the inner forceps straight instead of bent at an obtuse angle.

Male (type).—Head with front at narrowest 0.21 of head width; frontal row of seven bristles, extending from on a level with base of third antennal segment to two reclinate preverticals; facial ridge bristly on the lowest one-fifth; gena one-eighth eye height; frontal orbit silvery white; antenna black with first and second segments yellow, third joint four times second; arista thickened on basal one-fourth, penultimate segment short; palpus yellow.

Thorax black, heavy gray-pollinose marked with four mesonotal vittae; midtibia with one median anterolateral bristle, no inner ventral bristle; hind tibia ciliate, with one longer bristle.

Abdomen heavy gray pollinose; discal and marginal macrochaetae arranged as in *blanda*.

Female (allotype).—Front 0.25 head width; six frontal bristles; third segment of antenna three and three-fourths times second. Otherwise the description is the same as for the male.

One female paratype has two median anterolateral bristles on the midtibia.

Type locality.—Baraguá, Cuba.

Distribution.—Cuba 3.

Type.—Male, U.S.N.M. No. 54135.

Host.—*Autographa brassicae* (Riley) 2. This was previously reported by Aldrich and Webber as a host of *Zenillia blanda blanda* Osten Sacken.

Remarks.—Material examined consisted of type T. P. R. F. Ent. No. 3657D reared from T. P. R. F. 3469, Baraguá, Cuba, September 20, 1929 (Scaramuzza); allotype and female paratype, same locality and data, No. 3657B and No. 3657C; two female paratypes, reared

from *Autographa brassicae* Est. Cent. Agr. de Cuba, No. 8098a, April 22, 1916, Santiago de las Vegas; one female paratype, Baracoa, Cuba, September 1901 (Busck).

The spiracular entrances of the puparial stigmata are much more serpentine and convoluted than those of *Zenillia blanda*.

13. *ZENILLIA MARGINATA* Aldrich and Webber

Zenillia marginata ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 17, 1924.

Head with front of female at narrowest 0.28 head width; frontal row of seven bristles, if small ones are counted, otherwise four, extending from on a level with base of third antennal segment to the two reclinate preverticals; vertical and weak outer vertical bristles; facial ridge bristly on lowest one-fifth; gena one-sixth eye height, grayish pruinose with a yellow tinge; frontal orbit and face golden-pollinose, face slightly less so; antenna black, third segment three times length of second; arista thickened on basal one-third, penultimate segment short; palpus yellow.

Thorax black, golden pollinose marked with four mesonotal vittae; scutellum yellow, three pairs of marginal scutellars, one pair of discal scutellars; legs black; midtibia with one medium anterolateral bristle, one inner ventral bristle; hind tibia ciliate with one longer bristle.

Abdomen black covered with golden pollen; first segment and apical margins of segments 2 and 3 shining black; venter gray pollinose; first and second segments with a pair and third with a row of marginal macrochaetae; second and third segments with a pair and fourth with a row of discal macrochaetae; fourth segment with marginal bristles.

Length 7 mm.

Type locality.—Boulder, Colo.

Type.—Female, U.S.N.M. No. 25700.

Host.—Unknown.

Remarks.—The type was collected October 13, 1917 (Cockerell). In life this fly has a splendid golden color.

The female mentioned by Aldrich and Webber as being from Cornelia, Ga., is considered under *Zenillia dawsoni*, new species.

Aldrich and Webber confused *angustifrons* Townsend with *marginata*. *Zenillia angustifrons* is a distinct species.

14. *ZENILLIA FULGORIS*, new species

Zenillia ochracea (Van der Wulp) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 16–17, 1924.

Male (type).—Head with front at narrowest 0.30 head width, frontal row of seven or eight bristles, extending from below base of third antennal segment to two reclinate preverticals; facial ridges

bristly on lowest one-fifth; gena one-fifth eye height; frontal orbit golden, face, gena, and posterior orbit a little less so; antenna black, first and second segments obscurely rufous, third segment five times length of second; arista thickened on basal one-third, penultimate segment short; palpus yellow.

Thorax golden-pollinose, marked with four black mesonotal vittae; scutellum golden-pollinose, three pairs of marginal scutellars, discal scutellars if at all noticeable barely distinguishable from surrounding hairs; midtibia ciliate; wing with three and four bristles at base of third vein.

Abdomen covered with golden pollen which extends under on to the venter, the golden pollen much more gleaming than in *ochracea*, whose brownish tinge dulls the pollen; first segment shining black, gray-pollinose on venter; segments 2, 3, and 4 golden-pollinose on basal two-thirds to three-fourth, the shining black margins of second and third segments slightly V-shaped; first segment with a pair of marginal macrochaetae; second segment with a pair of discal and marginal macrochaetae; third segment with a pair of discal and a marginal row of macrochaetae; fourth segment with a discal and a marginal row of macrochaetae.

Hypopygium brownish black; inner and outer forceps of same length; outer forceps narrow and straight, and of same width throughout, with a blunt ending, tapering only slightly toward apex; outer forceps of *ochracea* wide, tapering gradually to a point, curving inward.

Female (allotype).—Front 0.32; frontal bristles six and seven in number; outer vertical bristle present; two fronto-orbital bristles; third antennal segment four and one-half times length of second. Two pairs of marginal scutellars; wing with two and three bristles at base of third vein. Otherwise the description is much the same as for the male.

The male paratype has only six frontal bristles; the third vein has one and two bristles at the base.

Type locality.—Hell Canyon, Manzano National Forest, N. Mex.

Type.—Male, U.S.N.M. No. 54136.

Host.—Unknown.

Remarks.—The type was collected by Townsend September 18, 1916, the allotype September 19, 1916, and the male paratype September 12, 1916, at an altitude of 7,200 feet.

15. ZENILLIA TAGLINOI, new species

Female (type).—Head with front at narrowest 0.28 head width; frontal row of four bristles, extending upward to two reclinate preverticals, first prevertical situated halfway between base of antenna

and vertical bristles; outer vertical rather weak; facial ridge bristly on lowest one-fifth; gena one-fifth eye-height, covered with white hairs, a row of black bristles along its anterior margin; third segment of antenna three and one-half to four times second; arista thickened on basal one-third, penultimate segment short; palpus yellow.

Thorax covered with golden-brownish pollen, marked with four black mesonotal vittae; scutellum golden brownish pollinose, three pairs of marginal macrochaetae, one pair of discal scutellars; middle tibia with one long median anterolateral bristle, one inner ventral bristle; wing more or less brownish along veins; third vein with three bristles at base.

Abdomen gray-pollinose underneath on venter, basal three-fourths of segments 2 and 3, and basal four-fifths of segment 4 golden-pollinose, heavily covered with a brilliant green; dorsum of first segments and apical borders of others shining black; first and second segments with a pair and the third and fourth with a row of marginal macrochaetae; second and third segments with a pair and the fourth with a row of discal macrochaetae.

Type locality.—Tafi Viejo, Tucuman, Argentina.

Type.—Female, U.S.N.M. No. 54137.

Host.—Unknown.

Remarks.—The material examined consisted of one female, Tafi Viejo, Tucuman, March 14, 1927 (Shannon), labeled "*Exorista coeruleiventris* V.d.W." "comp. type J.M.A." This specimen is not *Zenillia lineata* (Van der Wulp) (= *Exorista coeruleiventris* Van der Wulp).

16. ZENILLIA VIRIDIS (Townsend), new combination

Chrysocxorista viridis TOWNSEND, Proc. U. S. Nat. Mus., vol. 49, p. 435, 1915; Rev. Mus. Paulista, vol. 15, p. 265, 1926; Manual of myiology, pt. 4, pp. 94, 271, 1936.

Townsend's male allotype of *Chrysocxorista viridis*, U.S.N.M. No. 19611, is the type and genotype of *Chrysophryxæ*, new genus, *tibialis*, new species. *Townsend's* *angustifrons* (*Chrysocxorista*) is not synonymous with *viridis* Townsend.

Head with front of male at narrowest 0.24 and in female 0.27 the head width; frontal row of seven bristles, extending from on a level with the insertion of arista to the two reclinate preverticals; female with and male without outer vertical bristle; facial ridge bristly on the lowest one-fifth; gena one-fifth eye height; third segment of antenna in male four times and in female three and one-half times the second; arista thickened on basal one-third, penultimate segment short; palpus yellow.

Thorax covered with heavy golden-brown pollen, marked by four black mesonotal vittae; scutellum heavy golden-brown pollinose, three

pairs of marginal scutellars, one pair of discal scutellars; midtibia with one median anterolateral bristle, male lacking and female with one inner ventral bristle; hind tibia weakly ciliate with one longer bristle; wing with two or three bristles at base of third vein.

Abdomen with venter gray-pollinose on segments 1, 2, and 3; basal three-fourths of segments 2 and 3 and fourth segment almost entirely golden-brown pollinose; in certain reflections, dorsum of segment 3 of female with one or two green patches; dorsum of first segment, apical borders of segments 2 and 3, and the tip of segment 4 shining black; first and second segments with a pair and the third and fourth with a row of marginal macrochaetae; second and third segments with a pair and fourth with a row of discal macrochaetae.

Hypopygium brown; inner and outer forceps of the same length; outer forceps broad and leaf shaped, inner forceps blunt and spoon or cup shaped, narrowing toward the center and then broadening apically.

Type locality.—Casahuiri San Gaban Canyon, Peru.

Distribution.—Peru 2.

Type.—Female, U.S.N.M. No. 19611.

Host.—Unknown.

Remarks.—The material examined consisted of the type female, Casahuiri San Gaban Canyon, mountains of southeastern Peru, 4,500 feet, February 4, 1910 (Townsend); one male R. Charape, Peru, 4,500 feet, September 13, 1911 (Townsend).

The male that Townsend called the allotype does not belong here. The type female is not abnormal and is very similar to the male from Peru whose hypopygium has been described above. The chaetotaxy and coloration agree, and the two forms should be associated as the same species.

17. ZENILLIA LINEATA (Van der Wulp), new combination

Mystacella lineata VAN DER WULP, *Biologia Centrali-Americana*, Diptera, vol. 2, p. 54, 1890.

Exorista coeruleiventris VAN DER WULP, *Biologia Centrali-Americana*, Diptera, vol. 2, p. 64, 1890.

Remarks.—The writer had the privilege of examining the type material consisting of one male and one female of *Mystacella lineata* Van der Wulp and one female of *Exorista coeruleiventris* Van der Wulp. The females of both species are the same, which would confirm the synonymy.

All three specimens were noted as having four postsutural dorso-central macrochaetae, whereas the type specimen of *Zenillia taglinoi*, which Aldrich labeled "*Exorista coeruleiventris* V.d.W." "comp. type J.M.A." has only three postsutural dorsocentral macrochaetae.

Although the additional notes by the writer are rather incomplete, *Zenillia lineata* (Van der Wulp) is a species with four postsutural dorsocentral macrochaetae that in other respects closely resembles *Z. taglinoi*. Van der Wulp's specimen of *coaraleiventris* does not have the brilliant green color that the pollen of the abdomen of *Z. taglinoi* has.

18. *ZENILLIA FACIALIS*, new species

Male (type).—Head with front at narrowest 0.31 head width; all bristles on head missing, but scars indicating frontal row of eight bristles, extending from on a level with base of third antennal segment to two reclinate preverticals; ocellar, vertical, and perhaps weak outer vertical bristles; parafacial with a few fine hairs on the upper part which are directed downward; facial ridge apparently bristly on lowest one-fifth; gena one-fourth eye height; first and second segments of antenna yellow; third segment black, three times length of second; arista missing; palpus yellow.

Thorax golden-pollinose marked with at least four black mesonotal vittae; scutellum golden-pollinose, three pairs of marginal scutellars and one strong decussate apical pair turned backward, one pair of discal scutellars; pulvilli elongate, midtibia with one median antero-lateral bristle, one strong inner ventral bristle; hind tibia unevenly ciliate; wing with four bristles at base of third vein.

Abdomen black with sides reddish, venter gray-pollinose; basal three-fourth of segments two and three and basal two-thirds of segment four yellow-pollinose overlaid with green; dorsum of first segment and apical margins of other segments shining black; first and second segments with a pair, and third and fourth with a row of marginal macrochaetae; discal macrochaetae lacking on second segment, a pair on third, and a row on fourth.

Hypopygium with outer forceps broad, leaflike, and triangular; of same length as the inner, which is curved inwardly at the tip.

Length 10 mm.

Type locality.—St. Lucrecia, Veraacruz, Mexico.

Type.—Male, U.S.N.M. No. 54138.

Host.—Unknown.

Remarks.—Described from a badly rubbed specimen collected August 4, 1923 (E. G. Smyth). It was removed from *Zenillia ochracea* material, but it is a decidedly distinctive species.

An additional male in excellent condition was found in the collection after the above-described male had been cataloged as the type specimen, and it has been labeled as the paratype of No. 54138. It has eight frontal bristles and the facial ridges are bristly on the lowest two-fifths. Collected at Trujillo, Peru, December 14, 1938 (Jaynes).

19. ZENILLIA DAWSONI, new species

Zenillia marginata ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 17, 1924.

Male (type).—Head with front at narrowest 0.27 head width; frontal row of seven bristles on one side and six on the other, extending from on a level with base of third antennal segment to the two reclinate preverticals; no outer vertical bristle; facial ridge bristly on lowest one-fifth; gena one-sixth eye height, grayish pruinose with a yellow tinge; frontal orbit and face dull brown, golden-pollinose, face slightly less so; antenna black, third segment five times length of second; arista thickened on basal one-third, penultimate segment short; palpus yellow.

Thorax black, dull golden-pollinose, marked with four mesonotal vittae; scutellum black, heavily covered with golden pollen; three pairs of marginal scutellars and one shorter apical pair erect or proclinate, one pair of discal scutellars; legs reddish brown; midtibia with one median anterolateral bristle, inner ventral bristle lacking; hind tibia ciliate.

Abdomen black covered with dull-brownish-gold pollen; first segment shining black, narrow apical margins of segments 2 and 3 shining black, not distinct, tending to blend with pollen; first and second segments with a pair and third and fourth with a row of marginal macrochaetae; second and third segments with a pair and fourth with a row of discal macrochaetae.

Length 8.5 mm.

Female (allotype).—Front at narrowest 0.28 head width; four frontal bristles; with outer vertical bristle; third segment of antenna four times the second. Midtibia with inner ventral bristle. Otherwise the description is much the same as for the male.

There is one female paratype. It has five frontal bristles.

Type and allotype locality.—Dawson Camp, Ariz.

Distribution.—Arizona 1; New Mexico 2; Georgia 1.

Type.—Male, U.S.N.M. No. 54139.

Hosts.—*Ellopiia lactea* (Hulst) 1; under *Carpocapsa pomonella* (Linnaeus) band 1.

Remarks.—The material examined consisted of the type and allotype collected at Dawson Camp on September 7, 1917 (Townsend); one female paratype collected September 12, 1916, at Hell Canyon, N. Mex., elevation 7,200 feet (Townsend); one female is from Cornelia, Ga., under codling-moth band, August 30, 1921 (Van Leeuwen), the abdomen a little less golden; one female reared from *E. lactea* September 15, 1923, Lincoln National Forest, N. Mex. (Eldridge).

20. *ZENILLIA ANGUSTIFRONS* (Townsend), new combination

Chrysocrorista viridis angustifrons TOWNSEND, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 21, 1916; Manual of myiology, pt. 4, p. 271, 1936.

Zenillia marginata ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63 art. 17, pp. 17-18, 1924.

Head with front of male at narrowest 0.29 head width; frontal row of six bristles, extending from on a level below insertion of arista to two reclinate preverticals; no outer vertical bristle; facial ridge bristly on lowest one-sixth; gena one-seventh eye height; antenna black, second segment obscurely rufous, third segment six times the length of second; arista thickened on basal one-third, penultimate segment short; palpus yellow.

Thorax and scutellum heavy golden-brown pollinose; four mesonotal vittae; three pairs of marginal scutellars and one weak decussate apical pair, one pair of discal scutellars; legs reddish brown; mid-tibia with one median anterolateral bristle, one very weak inner ventral bristle; hind tibia ciliate, with one longer bristle; wing with two to three bristles at base of third vein.

Abdomen black covered with golden-pollinose, some specimens flecked with green; first segment, apical one-fourth to one-third of segments 2 and 3, and tip of fourth segment shining black; venter gray-pollinose; first and second segments with a pair and third and fourth with a row of marginal macrochaetae; second and third segments with a pair and fourth with a row of discal macrochaetae.

Hypopygium, inner and outer forceps of about the same width and length, narrow, tapering slightly, slightly concave.

Paratype locality.—Nova Chapada, Brazil.

Distribution.—Brazil 1, Bolivia 1.

Paratype.—Male, U.S.N.M. No. 20013.

Host.—Unknown.

Remarks.—Description based on one male paratype (Williston); one male labeled same as paratype; and seven males Rurrenabaque Beni, Bolivia, 1921-22 (Mann).

21. *ZENILLIA OCHRACEA* (Van der Wulp)

Exorista ochracea VAN DER WULP, Biologia Centrali-Americana, Diptera, vol. 2, p. 63, 1890.—VAN LEEUWEN, U. S. Dept. Agr. Techn. Bull. 90, p. 78, 1929.

Chryomasicera borealis TOWNSEND, Journ. New York Ent. Soc., vol. 23, pp. 230-231, 1915; Manual of myiology, pt. 4, p. 112, 1936.

Zenillia ochracea (Van der Wulp) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 16-17, 1924.

Head with front of male at narrowest 0.28 and of female 0.31 of head width; frontal row of eight bristles in male and six or seven in female, extending from on a level below insertion of arista to two reclinate preverticals in male and one in female; female only with

outer vertical bristle; facial ridge bristly on lowest one-fifth to one-fourth; gena one-fourth to one-third eye height; antenna black, third segment in male four and one-half to five and in female three times the second; arista thickened on basal two-fifths, penultimate segment short; palpus yellow.

Thorax dull golden-pollinose; four mesonotal vittae; scutellum yellowish with three pairs of marginal scutellars and one decussate apical pair turned backward, one pair of discal scutellars; legs reddish brown or black; midtibia with one median anterolateral bristle, female with one shorter bristle above on anterolateral side, one inner ventral bristle; hind tibia ciliate.

Abdomen golden-pollinose with a brownish tinge; first segment, apical one-fourth to one-third of segments 2 and 3, and vitta on second segment, black; apical border of pollen slightly V-shaped inward, making a broad obtuse angle; first and second segments with a pair and third and fourth with a row of marginal macrochaetae; second and third segments with a pair and fourth with a row of discal macrochaetae.

Hypopygium, inner and outer forceps of same length, outer forceps wide, tapering gradually to a point, curving inward.

Type localities.—Mexico and New Mexico.

Distribution.—Mexico 7, Costa Rica 1, New Mexico 1.

Type.—Type series of *Exorista ochracea*, British Museum. *Chrysomasicera borealis*, male, U.S.N.M. No. 19613.

Host.—Unknown.

Remarks.—Description based on an examination of the following material: Type male of *Chrysomasicera borealis* labeled "Top of Las Vegas Range, N. Mex., June 28. In life brilliant golden shot with green"; one female, Las Vegas, N. Mex., August 4 (Barber); one male, Atzacapotzaltongo, Mexico, August 31, 1922 (Smith); and one female, Mexico City, Mexico (Muller). Dr. Aldrich examined the type material of *ochracea* in the British Museum, and he was of the opinion that *borealis* is a synonym of *ochracea*.

The writer had the privilege of examining the type series of *Exorista ochracea*. This series is a composite mixture of species, some specimens of which resemble *borealis*.

2. Genus PHRYXE Robineau-Desvoidy

Phryxe ROBINEAU-DESVOIDY, Mém. Acad. Sci. Inst. France, vol. 2, p. 158, 1830; Histoire naturelle des diptères des environs de Paris, vol. 1, p. 329 [on page 358 (*P. athaliac* Robineau-Desvoidy) = *Tachina vulgaris* Fallen], 1863.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, p. 589, 1910.—TOWNSEND, Manual of myiology, pt. 4, pp. 220-221, 224-226, 272, 280, 1936. (Genotype, (*P. athaliac*) = *Tachina vulgaris* Fallen. By designation of Robineau-Desvoidy, 1863, in synonymy.)

- Blepharidea* RONDANI, Dipterologiae italicæ prodromus, vol. 1, p. 67, 1856.
(Genotype, *Tachina vulgaris* Fallen. Monotypic.)
- Exorista* of COQUILLETT (nec Meigen), partim, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 93, 1897.
- Zenillia* of ALDRICH and WEBBER (nec. Robineau-Desvoidy), partim, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 26-28, 1924.
- Plagiophryxæ* TOWNSEND, Insecutor Inscitiæ Menstruus, vol. 14, p. 33, 1926.
(Genotype, *P. pecosensis* Townsend. By original designation.)

This genus is small and compact with only two species known to occur in the Nearctic realm. One species is Palearctic and the other Nearctic. The various Palearctic concepts of the *Phryxæ* complex have yet to be reconciled. Although the generic characters usually cited by previous revisers are weak, the genus *Phryxæ* (s. s.) is fairly well agreed upon. Aldrich and Webber's concept of *Phryxæ* is not tenable. *Phryxæ* is closely related to the genera *Madremyia* and *Thelymyia*. The main difference between *Phryxæ* and *Madremyia* is that in the latter the facial ridges are bristly above the middle and the second segment of the arista is more elongated. Townsend places *Phryxæ* in the tribe Lydellini and *Madremyia* in the tribe Frontinini.

The front at the vertex or narrowest part is more than one-third the head width, often being two-fifths. This character, coupled with the sexual characters that the front of the male is equal to the front of the female and that the claws and pulvilli are small in both sexes, serves to separate the genera *Phryxæ* and *Thelymyia* from the other genera. *Phryxæ* is separated from *Thelymyia* by apical scutellars erect or proclinate, decussate; palpus black; four dorsocentral macrochaetae; male without frontal orbital bristle.

KEY TO THE SPECIES OF PHRYXÆ¹³

1. Species definitely pollinose; thorax grayish pruinose with decided bluish tinge (especially noticeable if viewed without use of artificial light), five definite mesonotal vittae discernible behind suture, median one obsolete before suture; abdomen gray-pruinose with bluish tinge, narrow and fairly well defined hind margins on segments 2, 3, and 4 and median dorsal vitta shining black, the heavy pollen (silvery in artificial light) broadly present and pronounced on median dorsal region of segments 2, 3, and 4 in the various lights. Palpus varying from usual pale or yellowish brown to brownish black; midtibia with usually two long easily noted median anterolateral bristles, usually only one above longest middle bristle; one long and one very short inner ventral bristle on midtibia; hind tibia exhibiting some tendency to be subciliate; sides of male and female abdomens distinctly red.----- 1. *vulgaris* (Fallen) (p. 33)
- Species less definitely or more thinly pollinose, subshining black; thorax so thinly grayish pruinose with a bluish tinge that mesonotal vittae are not

¹³ One must experiment with holding the specimens in various positions in the light so that the pollen or pruinosity pattern is symmetrical; otherwise this characteristic will not be of much value. Pollen patterns have a sound value, but they are deceptive and difficult to use.

or are only with the greatest of difficulty discernible behind suture, and the four vittae before suture can be seen with difficulty; abdomen less definitely primrose, broad and poorly defined hind margins on segments 2, 3, and 4 and an indistinct median dorsal vitta shining black, the heavy pollen confined mostly to sides of abdomen and to a narrow basal margin or entirely absent in median dorsal area of segments 2, 3, and 4 in various lights. Palpus brownish black to black; midtibia more bristly, especially in female, with three or more easily noted median anterolateral bristles, usually two bristles above longest middle one; midtibia with one long and one shorter inner ventral bristle, the shorter one often approaching or in vicinity of half the length of the longer; hind tibia with uneven bristles; sometimes fourth segment almost wholly shining black; sides of female abdomen black or only slightly red

2. *pecosensis* (Townsend) (p. 35)

1. *PHRYXE VULGARIS* (Fallen) (genotype)

The complete synonymy is so voluminous that considerable of the early portion is not cited. For a more complete record the reader is referred to Bezzi and Stein, Coquillett, Aldrich and Webber, Lundbeck, and Townsend.

Tachina vulgaris FALLÉN, Svenska Vet.-Akad. Handl., vol. 31, p. 275, 1810.

Phryxe athaliae and 21 other species, ROBINEAU-DESVOIDY, Mém. Acad. Sci. Inst. France, vol. 2, pp. 159-170, 1830. (Synonymy, Bezzi and Stein, 1907.)

Blepharidea vulgaris (Fallen) RONDANI, Dipterologiae Italicae prodromus, vol. 1, p. 67, 1856.—HOWARD and FISKE, U. S. Dept. Agr., Bur. Ent., Bull. 91, pp. 91, 136, 304, 1911.

Phryxe vulgaris (Fallen) ROBINEAU-DESVOIDY, Histoire naturelle des diptères des environs de Paris, vol. 1, pp. 329-458 (more than 200 additional names with "descriptions"), 1863.—BEZZI and STEIN, Katalog der paläarktischen Dipteren, vol. 3 (these authors placed at least 245 of Robineau-Desvoidy's names under *Phryxe vulgaris*), 1907.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, p. 589, 1910.—LUNDBECK, Diptera Danica, pt. 7, p. 334, 1927.—TOWNSEND, Manual of myiology, pt. 4, pp. 224-226, 1936.

Exorista hirsuta OSTEN SACKEN, Can. Ent., vol. 19, p. 163, 1887.—WILLISTON, Scudder's Butterflies of Eastern United States and Canada, vol. 3, p. 1919, pl. 89, figs. 13-15, 1889.—TOWNSEND, Manual of myiology, pt. 4, p. 226, 1936.

Exorista vulgaris (Fallen) COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 93, 1897.—CHITTENDEN, U. S. Dept. Agr., Farmers' Bull. 1461, 1926.

Zenillia vulgaris (Fallen) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 26-28, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925; Biological Survey of Mount Desert region, The insect fauna, pt. 1, p. 201, 1927.—ESSIG, Insects of western North America, p. 581, 1926.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Pub. 188, p. 113, 1934.

Townsend considers *Phryxe hirsuta* (Osten Sacken) to be distinct from *P. vulgaris* and *P. pecosensis*, but closer to *vulgaris*. Townsend does not cite the differences, but this may be because Townsend believes that *vulgaris* does not occur in North America.

Head with front of male at narrowest 0.39 to 0.40 (in five specimens) and front of female 0.38 to 0.40 (in five specimens) of head width; red-

dish brown frontalia at least one-third width of front; frontal row of seven to nine bristles in male, six to eight in female, plus two reclinate upper frontals, often three in male, extending down below level of insertion of arista; in European males it has been noted there is a tendency toward some strong bristles outside the frontal row (this observation serves further to decrease the generic differences between *Phryxe* and *Madremyia*); female with two proclinate fronto-orbital bristles; both sexes with outer vertical bristle; facial ridge bristly on lowest one-third to halfway; gena one-fourth eye height; frontal orbit silvery gray, slightly more blackish toward vertex, face and parafacial silvery white, gena silvery gray; antenna black, third segment in male nearly four times and in female nearly three times as long as the second segment; arista thickened on at least basal half, penultimate segment elongate, at least longer than broad; palpus varying from pale or yellowish brown to brownish black (the former are more apt to be those specimens from *Pieris rapae*; the palpi of the European specimens are uniformly darker than those of the American specimens).

Thorax black; scutellum bluish-gray pollinose, black at base, broad apex usually and tip always yellow, three long pairs of marginal scutellars and a shorter erect or proclinate decussate apical pair, one pair of discal scutellars; three sternopleural macrochaetae; front tibia with two bristles on median posterolateral side; wing a little tinged, third vein with two or three bristles at base; squamulae whitish.

Abdomen fairly well covered with pollen; abdominal hairs erect in male, some approaching macrochaetae in size in discal region, hairs suberect in female; second segment with a pair of discal and marginal macrochaetae; third with a pair of discals and a marginal row; fourth segment tipped with bristles and long fine hairs instead of macrochaetae, discals seeming to be irregularly placed and sometimes to follow roughly a row; sides of abdomen in male and usually only second abdominal segment in female with a somewhat variable red spot.

Length 7-9 mm. On the average this species is slightly larger than *Phryxe pecosensis*.

Distribution.—Europe, extending to middle Sweden in the north; Maine 7, New Hampshire 3, Massachusetts 25, Connecticut 1, Rhode Island 3, New Jersey 1, Washington 1, British Columbia 1. In this case it is difficult to assign much value to published records without an examination of the material involved, or unless the host is mentioned. New York may be included here, but it is considered that many of the other published records involve material of *Phryxe pecosensis*.

Hosts.—*Pieris rapae* (Linnaeus) 127, *Porthetria dispar* (Linnaeus) 1, *Evergestis straminealis* (Hübner) 1. Only *Pieris rapae* of Schaffner and Griswold's list belongs here. The recorded and published European host list is a long and extensive one. Howard and Fiske

record rearing *Phryxæ* (*Blepharidea*) *vulgaris* from Europe-collected *Nygmyia phacorrhoea* (Donovan). Osten Sacken records the type specimen of *hirsuta* from *Pieris rapae* (Lintner). Williston records rearing *hirsuta* from *P. rapae*.

Remarks.—The description is based on an examination of 12⁹ reared specimens recorded above bearing Gypsy Moth Laboratory note numbers; 3 collected specimens (Dyar, Townsend, Baker); 5 male and 5 female European specimens determined by Bezzi, Brunetti, and Brauer and Bergenstamm; and an indefinite number of European specimens.

Baer states that *Phryxæ vulgaris* deposits banana-shaped eggs on the host that are ready to hatch (Pantel's group 6). Townsend records that "females of the *Phryxæ* group deposit their maggots in choria on the host." Lundbeck places *P. vulgaris* in Pantel's group 6, "ovoviviparous species depositing on the skin of the host." Adults, May to October; number per host, one, occasionally several; generations, two or more; hibernation, as larva in the host.

2. PHRYXE PECOSENSIS (Townsend)

(?) *Exorista hirsuta* Osten Sacken, TOWNSEND, Psyche, vol. 6, p. 467, 1893.

Exorista vulgaris (Fallen) COQUILLETT (partim), U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 93, 1897.

Exorista vulgaris of authors (nec Fallen) TOTHILL, Can. Ent., vol. 45, p. 71, 1913.—REGAN, Montana Agr. Exp. Stat. Bull. 154, p. 53, 1923.

Zenillia vulgaris (Fallen) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 26-28, 1924.—JOHNSON (partim), List of New England Diptera, p. 196, 1925.—ESSIG (partim), Insects of western North America, p. 581, 1926.—WEST (partim), Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—SCHAFFNER and GRISWOLD (partim), U. S. Dept. Agr. Misc. Publ. 188, p. 113, 1934.

Plagiophryxæ pecosensis TOWNSEND, Insecutor Inscitiae Menstruus, vol. 14, p. 33, 1926; Manual of myiology, pt. 4, pp. 225-226, 1936.—ALDRICH, Bull. Brooklyn Ent. Soc., vol. 22, p. 24, 1927.

In 1927 Aldrich considered *Plagiophryxæ pecosensis* Townsend a synonym of *Zenillia vulgaris* (Fallen) from Townsend's description. Later unpublished notes by Aldrich indicate that Townsend, when on a visit to the National Museum, synonymized *Plagiophryxæ* with *Phryxæ*.

Townsend's description of *Plagiophryxæ pecosensis* adequately characterizes this species.

The recognition of *pecosensis* goes a long way toward reducing the confusion that previously existed concerning the real identity of *Phryxæ vulgaris* in North America. The writer has noticed that in many Palearctic and Nearctic species considered by specialists to be Holarctic in their distribution and morphologically inseparable there are eventually discovered small differences that serve to keep their

identities separate. This indicates a common origin of these species that have been separated by geographical barriers for a sufficient length of time to be differentiated by small morphological characters, differences in biology, and host preferences. These individual peculiarities are maintained even when the forms are brought together in the same habitat either by artificial or other means of dissemination. *P. vulgaris* and *P. pecosensis* are examples of this. Several others will be cited in this paper. *P. vulgaris* apparently accompanied *Pieris rapae* in its spread to the Nearctic realm, whereas *P. pecosensis* is a Nearctic species.

Townsend published a good description of the species. A few of the minor differences from *vulgaris* that this latest study indicates are noted: A blacker, distinctly more subshining species. Head with front of male at narrowest 0.35 to 0.38 (in five specimens) and front of female 0.37 to 0.38 (in five specimens) of head width; frontal bristles exhibiting a tendency to be fewer in number than in *vulgaris*, but there is no clear-cut demarcation, usually only two reclinate upper frontals (prevertical bristles); facial ridge bristly on lower one-half to two-fifths; antenna black, third segment in male four times or slightly more and in female nearly three times as long as second segment; arista thickened on basal half, penultimate joint elongate; palpus usually black, varying to brownish black.

Thorax black, subshining; when held at the same angle and in a more or less upright position in which the mesonotal vittae of *vulgaris* behind the suture are easily seen, the mesonotal vittae of *pecosensis* are not visible.

Sides of second abdominal segment in male reddish and in female usually black or only slightly red.

Length 7-9 mm. On the average this species is slightly smaller than *Phryxe vulgaris*.

Type locality.—Pecos National Forest, N. Mex.

Distribution.—Maine 2, New Hampshire 8, Vermont 5, Massachusetts 11, New York 5, Montana 2, Idaho 2, California 1, Washington 1, British Columbia 1. Published records: Quebec, several places (Tothill); New Brunswick (Squires); and Illinois (Forbes). There exist additional doubtful records that can be confirmed only from an examination of the specimens involved. Essig's record probably refers to the specimens listed above under Idaho and Washington.

Hosts.—*Erannis tiliaria* (Harris) 56, *Archips cerasivorana* (Fitch) 15, *Ennomos subsignarius* (Hübner) 6, *Cirphis unipuncta* (Haworth) 4, *Cingilia catenaria* (Drury) 3, lepidopterous pupa 3, *Danaus plexippus* (Linnaeus) 2, unidentified noctuid 2, *Archips argyrospila*

(Walker) 2, *Archips infumatana* (Zeller) 1, *Alsophila pometaria* (Harris) 1, *Graptolitha antennata* (Walker) 1, *Hemileuca maia* (Drury) or *H. lucina* Henry Edwards 1. Except for *Pieris rapae* (Linnaeus), Schaffner and Griswold's list of *Zenillia vulgaris* (complex) hosts all refer to *Phryxæ pecosensis*. Recorded as *P. vulgaris* records, but considered by the author to be probably *P. pecosensis* records: *Archips fumiferana* (Clemens) (Tothill, Johnson, Essig), *Synclora rubrifrontaria* Packard (Schaffner and Griswold), *Nephelodes cinnamdomia* (Cramer) (Squires, Aldrich notes as *vulgaris*), *Pyrausta penitalis* (Grote) (Forbes, questionable, as Townsend determined it as *hirsuta*). Essig's record of *C. unipuncta* most probably refers to *P. pecosensis*. It is possible that Tothill's record of *Archips fumiferana* should be referred to *Aplomya caesar* (Aldrich) instead of to *P. pecosensis*.

Remarks.—The description is based on 96 reared specimens recorded above bearing Gypsy Moth Laboratory note numbers; 1 male ex *Archips argyrospila* (Walker) (Regan); and 27 males and 19 females collected in various places by Townsend, Aldrich, Morrison, Riley, Currie, and Caudell.

Regan indicates that the larva leaves the host pupa when ready to pupate. Adults, May to October; number per host, one, occasionally several; generations, two or more; hibernation, as larva in the host.

3. Genus CARCELIA Robineau-Desvoidy

Carcelia ROBINSON-DESVOIDY, Mém. Acad. Sci. Inst. France, vol. 2, p. 176, 1830;

Histoire naturelle des diptères des environs de Paris, vol. 1, p. 220, 1863.

—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, p. 518, 1910.—VILLENEUVE, Feuille Jeun. Nat., Ser. 5, vol. 42, p. 90, 1912.—BARANOFF, Institut für Hygiene und Schule für Volksgesundheit, Zagreb, Arb. parasit. Abt. 3, 1931; Trans. Roy. Ent. Soc., vol. 82, pp. 387–408, 1934.—TOWNSEND, Manual of Myiology, pt. 4, p. 209, 1936. (Genotype, *Carcelia bombylans* Robineau-Desvoidy. By designation of Coquillett 1910 in synonymy.)

Senometopia MACQUART, Mém. Soc. Sci. Lille, p. 296, 1883.—TOWNSEND, Manual of myiology, pt. 4, p. 210, 1936. (Genotype, *Tachina excisa*. By designation of Townsend.)

Stenometopia Macquart, AGASSIZ, Nomenclatoris zoologici index universalis, pp. 338, 351, 1846.

Chetoliga RONDANI, Dipterologiae Italicae prodromus, vol. 1, p. 66, 1856.—TOWNSEND, Manual of myiology, pt. 4, pp. 273, 284, 1936. (Genotype, *Tachina gnava* Meigen. Monotypic 1856.)

Chetolyga RONDANI, Dipterologiae Italicae prodromus, vol. 3, p. 93, 1859.

Chaetolyga Rondani, SCUDDER, Nomenclator zoologicus, Supplement List, p. 66, 1882.

Paraexorista BRAUER and BERGENSTAMM, Denkschr. Akad. Wiss. Wien, math. nat. Kl., vol. 56, p. 87, 1889.—TOWNSEND, Manual of myiology, pt. 4, pp. 210, 285, 1936. (Genotype, *Exorista cheloniac* Rondani. Monotypic example; Brauer and Bergenstamm 1889.)

- Parcexorista* BRAUER and BERGENSTAMM, Denkschr. Akad. Wiss. Wien, math.-nat. Kl., vol. 56, p. 161, 1889.—BARANOFF, Trans. Roy. Ent. Soc., vol. 82, pp. 387-403, 1934.
- Sisyropa* BRAUER and BERGENSTAMM (partim), Denkschr. Akad. Wiss. Wien, math.-nat. Kl., vol. 58, p. 344, 1891.
- Exorista* of COQUILLET (nec Meigen), partim, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 91, 1897.
- Zenillia* of ALDRICH and WEBBER (nec Robineau-Desvoidy), partim, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 7, 1924.
- Senexorista* TOWNSEND, Supplementa entomologica, No. 16, p. 63, 1927.—BARANOFF, Trans. Roy. Ent. Soc., vol. 82, p. 404, 1934. (Genotype, *S. sumatrana* Townsend. By original designation.)
- Eucarcelia* BARANOFF, Trans. Roy. Ent. Soc., vol. 82, p. 393, 1934. (Genotype, *Tachina excisa* Fallen. By original designation.) (New synonymy.)
- Oxexorista* TOWNSEND (partim), Manual of myiology, pt. 4, pp. 206-207, 209-212, 1936. (New synonymy.)

The customary procedure has been to accept *Tachina gnava* Meigen (= *Carcelia bombylans* Robineau-Desvoidy) as the genotype. In 1912 Villeneuve separated *C. bombylans* and *C. gnava* as two distinct species, and at the same time he indicated that *gnava* of Macquart (nec Meigen) = *bombylans*. Stein disagreed with Villeneuve and again synonymized the two forms. Townsend considers the two species to be synonymous. By further study the two species *gnava* and *bombylans* have been definitely separated, which confirms Villeneuve's disposition of the two species. *Carcelia bombylans* Robineau-Desvoidy, an included species, must be accepted as the genotype. The issue is complicated further by a third species (numerous specimens reared from *Dasychira pulibunda* (Linnaeus) and one specimen from *Orgyia gonostigma* (Fabricius) in the *gnava* complex which has been placed in the so-called *bombylans* group, but in most characteristics it more closely approximates the species *gnava*). This third species is *Carcelia rasa* Macquart (= *amphion* Robineau-Desvoidy) (= *angusta* Brauer and Bergenstamm). Its relationship with *Carcelia bombylans* remains to be settled by comparison with the type, using our present-day conception of what constitute specific characters in the genus *Carcelia*. This does not invalidate the acceptance of *bombylans* as the genotype.

Baranoff, using Townsend in part, has divided the genus *Carcelia* for the Palearctic and Oriental realms into 15 genera. He recognized 3 genera [*Earyclea* Rondani (= *Phlebotomyia* Brauer and Bergenstamm), *Isocarcelia* Villeneuve, and *Tricarcelia* Baranoff] as being peculiar to the Palearctic species, 9 genera [*Catacercelia* Townsend, *Myrocercelia* Baranoff, *Carceliella* Baranoff, *Eocarcelia* Townsend (= *Eocarceliopsis* Townsend), *Microcercelia* Baranoff, *Zygocarcelia* Townsend, *Carceliopsis* Townsend, *Isocarceliopsis* Baranoff, and *Asiocarcelia* Baranoff] for the Oriental species, and 3 genera [*Car-*

celia Robineau-Desvoidy. *Paracoxista* Brauer and Bergenstamm (= *Senecoxista* Townsend), and (*Eucareelia* Baranoff) = *Senometopia* Macquart sensu Townsend| as being applicable to both realms. As the writer is impressed by the close resemblance of some of the species of the Nearctic and Palearctic regions, the probable value of the Palearctic genera *Tricareelia*, *Senometopia*, *Careelia*, *Paracoxista*, *Euryclea*, and *Isocareelia* should be considered. To apply Baranoff's table beyond *Tricareelia*, *Careelia amplexa* with its variable characters of three or four dorsocentral macrochaetae, inner ventral bristle of the midtibia weak or wanting, and with or without discal macrochaetae, would cause considerable trouble with the proposed classification. After the division made on the absence or presence of an inner ventral bristle on the midtibia, the main subdivisions of the classification are based on male characters later reverting to female characters to establish the validity of the genera (*Pelmatomyia*) = *Euryclea* and *Isocareelia*. It is a doubtful procedure to recognize genera established on sexual characters only, and it is the writer's opinion that *Euryclea* and *Isocareelia* should not be given even subgeneric recognition. In (*Eucareelia*) = *Senometopia* with the hind coxa without small bristles behind at the apex, the abdomen may be with or without discal macrochaetae; while in the alternative bracket with the hind coxa with small bristles behind at the apex, the classification is divided into *Careelia* without discal macrochaetae and *Paracoxista* with discal macrochaetae.

Apparently Baranoff's restricted genera utilized in his treatment of the *Careelia* complex were not available in time for incorporation in Townsend's Manual of Myiology. Townsend places his genera concerned in three different tribes. Townsend's designation of *Careelia laeifrons* Villeneuve as the genotype of *Paracoxista* cannot be accepted, as *Euxoxista cheloniae* Rondani was the monotypic example when Brauer and Bergenstamm proposed the genus *Paracoxista*.

The Palearctic concepts of the genus *Careelia* are fairly well agreed upon. Nearly everyone has accepted Villeneuve's idea of the genus that it forms a natural group. The accepted disposition has been to place all "*Euxoxista*" (s. l.) species having two sternopleural macrochaetae and hind tibiae ciliate in this genus. The more pertinent and diagnostic characters of eye high and jowl or gena linear have not been given the prominence they deserve. The last-mentioned characters have been used in this paper to place the genus *Careelia* on a stronger systematic basis. It has been necessary to broaden the concepts of the genus to allow for the inclusion of forms having three sternopleural macrochaetae. Aldrich and Webber distributed their species of *Careelia* among three of their subgenera; their subgenus *Paracoxista* is too broad to be usable. Some European authorities

consider *Carcelia* in most respects to be similar to *Winthemia*. While I admit a strong systematic relationship, it is doubtful if *Carcelia* and *Winthemia* are as closely related biologically as perhaps *Sisyrropa* and *Winthemia*. In the Nearctic realm *Carcelia* is biologically related to *Gymnocarcelia*, genotype *ricinorum* Townsend, a bare-eyed species with *Carcelia*-like characters that has been removed from *Sturmia*. Townsend places *Carcelia* and *Gymnocarcelia* in the tribe Carceliini and the genus *Winthemia* in the tribe Sturmiini.

In a restricted sense the Nearctic species belong to the subgenera *Carcelia* and *Paracxorista*, but the lines of demarcation between the two genera as previously defined are clearly lacking. The following treatment is suggested for those workers who prefer or insist on restricted genera or a definition of species groups:

1. *formosa*, *inflatipalpis*, *lagoae*.
2. *diacrisiae*, *amplexa*, *perplexa*, *olenensis*, *yalensis*.
3. *reclinata* (*Paracxorista*).
4. *malacosomae*, *laxifrons*, *protuberans*.
5. *flavirostris*.
6. *gnava* (*Chetoliga*).
7. *separata* (*Senometopia*).

The combination of groups 1 and 2 equals Townsend's concepts of *Oreoxorista*. The combination of groups 3 and 4 equals the previous concept of *Paracxorista*. The recognition of *Chetoliga* would be dependent upon dividing *Carcelia* (s. s.) into a *gnava* group and a *bombylans* group. As no useful taxonomic or bionomic result can be achieved at this time by carrying out such a program, the genus *Carcelia* is retained as proposed.

The oviposition habits of the genus *Carcelia* should be discussed to demonstrate its biological unity. Lundbeck states that "*gnava* and *cheloniae* belong to Pantel's group 10 as characterized by pedunculate eggs, and the same no doubt holds good for the other species" of *Carcelia*. Brown mentions that the eggs of *gnava* are laid on the ends of the hairs of the hosts. Townsend describes the eggs of *Paracxorista* and *Oreoxorista* as being of the elongate, cylindrical, pedunculate type. The females of *formosa*, *amplexa*, *laxifrons*, *malacosomae*, *separata*, *rasa*, and *cheloniae* (if not confused with *laxifrons* or the so-called "*cheloniae*" in American literature) all deposit elongate, cylindrical, pedunculate eggs that are attached either to the hairs of the host or fastened to the body. *C. gnava*, which has been much confused with *separata* in literature, has a strange and most interesting habit of projecting its eggs or larvae through the air successfully for a distance from one-half the length of the body of the adult up to at least one-half inch. In agreement with Lundbeck, the writer believes that the eggs of the other species of this group will be of the elongate, cylindrical, pedunculate type.

Most of the species of *Carcelia* possess an inner ventral bristle on the midtibia and small bristly hairs behind at apex of hind coxa. *Carcelia separata* lacks both these characters. In a few species there is exhibited a tendency to the lack of an inner ventral bristle to become a secondary sexual character. Except for *C. separata*, all the other species treated in the following key have the hind coxa with small bristly hairs behind at the apex.

KEY TO THE SPECIES OF CARCELIA

There are 15 species included in the key, 12 of which are known to occur in the Nearctic realm and one in the Neotropical realm. As the Palearctic species *Carcelia separata* and *C. gnava* have been released in the northeastern part of the United States, they are included, but to date there is no evidence to indicate that they are established. It was considered that the systematic value of the table would be increased even if *separata* and *gnava* are never recovered in North America; it will also help to keep the identity of the two species separate in our literature. The Palearctic species of this group are so similar to many Nearctic species that much confusion in their identity has arisen. Sufficient Palearctic material has been examined to place the knowledge of the Nearctic species of *Carcelia* on a firm basis.

1. Midtibia with one median anterolateral bristle; fore tibia with one or two median posterolateral bristles..... 7
- Midtibia with two or more median anterolateral bristles; fore tibia with two median posterolateral bristles..... 2
2. Sternopleural macrochaetae two..... 4
- Sternopleural macrochaetae three..... 3
3. Palpus normal and flat; no discal bristles on second and third abdominal segments..... 1. *formosa* (Aldrich and Webber) (p. 43)
- Palpus swollen; small or weak discal bristles on second and third abdominal segments..... 2. *inflatipalpis* (Aldrich and Webber) (p. 45)
4. Discal bristles or macrochaetae on second and third abdominal segments... 5
- No discal bristles or macrochaetae on second and third abdominal segments..... 3. *gnava* (Meigen) (p. 45)
5. Frontal bristles on parafacial not nearer to facial ridge than to margin of eye, descending to at least on a level with insertion of arista; facial ridge usually bristly on more than lowest one-fourth, often ascending to near middle especially in males; more or less developed discal bristles or macrochaetae on second and third abdominal segments, more or less irregularly arranged; when viewed from behind inner forceps of hypopygium closely approximated 6
- Frontal bristles on parafacial nearer facial ridge than margin of eye, descending to at least on a level with base of third antennal joint; facial ridge usually bristly on lowest one-fourth, sometimes ascending slightly higher in males; discal bristles on second and third segment approach weak macrochaetae in size (usually one pair of weak discal macrochaetae on third segment); when viewed from behind inner forceps of hypopygium widely separated..... 4. *reclinata* (Aldrich and Webber) (p. 48)

6. Front and face silvery-gray pollinose; parafacial bearing usually several easily discernible hairs on upper side below frontal bristles, these hairs rarely absent; thorax light brown on sides and black on dorsum; femora light brown, concolorous with tibiae, and about same color as sides of thorax; midtibia with one anterolateral bristle about the middle with one or more above, with usually none below but when present small.

Abdomen, including dorsal shoulders of first segment and hind margins of second and third segments, covered with gray pollen without sheen; abdominal vitta obscure and not clearly marked, especially on third segment when held in a light that does not allow reflection of pollen to vary on either side; sides of male abdomen more or less broadly and distinctly rufous. A lighter, more brownish form than *Carcelia laxifrons*, the gray pollen often mixed with a brownish tinge

5. *malacosomae*, new species (p. 50)

Abdomen mostly yellow, with a narrow black vitta on dorsum. A lighter, more yellowish form than *Carcelia malacosomae* (male only)

6. *protuberans* (Aldrich and Webber) (p. 54)

Front and face silvery-gray pollinose, with a smoky tinge; parafacial usually bare on upper side below frontal bristles, when present hairs one or two in number are smaller, not so distinctive, and difficult to locate without aid of higher powers of binocular; thorax black on sides and dorsum; femora black contrasting with brown tibia, mid-tibia with one anterolateral bristle about middle with one or more smaller above, and usually one below sometimes quite long; hind tibia appearing to be more subciliate but not distinctly so; abdomen covered with gray pollen, dorsal shoulders of first segment thinly pollinose, very narrow apical margins of second and third segments black; abdominal vitta clearly marked or defined especially on third segment, when held in a light that does not allow reflection of pollen to vary on either side; sides of male abdomen blacker, only obscurely rufous on intermediate segments. A blacker form-----

7. *laxifrons* Villeneuve (p. 54)

7. Front tibia with two median posterolateral bristles; legs never wholly black----- 11

Front tibia with one median posterolateral bristle----- 8

8. Median inner ventral bristle on midtibia present----- 9

Median inner ventral bristle on midtibia lacking

8. *separata* (Rondani) (p. 56)

9. Two sternopleural macrochaetae, legs black----- 10

Three sternopleural macrochaetae----- 9. *lagoae* (Townsend) (p. 58)

10. Row of discal macrochaetae on fourth segment

10. *flavirostris* (Van der Wulp) (p. 60)

No discal macrochaetae, legs wholly black

11. *diacrisiae*, new species (p. 61)

11. Femora black and tibia brown or yellow, not concolorous----- 12

Femora and tibia yellow, concolorous----- 12. *amplexa* (Coquillett) (p. 63)

12. Abdomen reddish yellow on sides; male usually with one reclinate upper frontal bristle and two reclinate prevertical bristles; female with one pair of marginal macrochaetae on second abdominal segment; male and female with one strong inner ventral bristle on midtibia, longer than and situated higher on tibia toward femur than the lower of the two median posterolateral bristles----- 13. *perplexa*, new species (p. 65)

Abdomen predominantly black with reddish-yellow areas on sides in male, female black but sometimes reddish yellow; male with only two reclinate

- prevertical bristles, abdomen with long fine hairs on discal portions of second and third segments, inner ventral bristle on midtibia small, weak or lacking; female with one pair of marginal macrochaetae on second abdominal segment, inner ventral bristle on midtibia about same size as the lower of the two posterolateral bristles; pollen of thorax and abdomen with a bluish tinge----- 14. *olenesis*, new species (p. 67)
- Abdomen black; male with two reclinate prevertical bristles; female with two pairs of marginal macrochaetae on second segment of abdomen; male and female with one strong inner ventral bristle on midtibia
15. *yaleensis*, new species (p. 69)

1. *CARCELIA FORMOSA* (Aldrich and Webber), new combination

- Exorista eudryae* of COQUILLET (nec Townsend) (partim), U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, pp. 13-14, 1897.
- Oxexorista eudryae* (Townsend), 1912 nec 1892, Proc. Ent. Soc. Washington, vol. 14, p. 165. (New synonymy.)
- Oxexorista thompsoni* TOWNSEND (partim), Proc. Biol. Soc. Washington, vol. 28, p. 21, 1915; Manual of myiology, pt. 4, p. 211, 1936. (New synonymy.)
- Zenillia formosa* ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 23-24, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 112, 1934.
- Oxexorista formosa* (Aldrich and Webber) TOWNSEND, Manual of myiology, pt. 4, p. 212, 1936.

The female paratype of *formosa* bearing the notation TD395 clears up Townsend's concept of *Oxexorista thompsoni* even if the name cannot be utilized. Although Townsend visualized the specimen TD395 when he proposed the new species *thompsoni*, he selected as the type a specimen that has proved to be *Sisyropa eudryae* Townsend. This is discussed in more detail under the genus *Sisyropa*.

Head with front of male at narrowest 0.22 to 0.23 (in six specimens) and in female 0.25 to 0.28 (in six specimens) of head width; frontal row of seven to eight bristles in male and five to seven in female, extending from base of third antennal segment to the two reclinate upper frontals (preverticals); facial ridge bristly on lowest one-fifth; gena one-fifteenth or less eye height; frontal orbit, face, cheek, and posterior orbit silvery-white pollinose; antenna black, first and second segments usually faintly reddish in female, third segment of male nearly four times and in female at least three times length of second; arista thickened on basal one-fourth to one-third, gradually tapering to open, penultimate segment short; palpus yellow, flat, not swollen, clothed with fine black hairs some of which are present on apical portion.

Thorax black covered with silvery-gray pollen, marked by five black mesonotal vittae; four postsutural dorsocentral macrochaetae; scutellum yellowish, well covered with gray pollen, three pairs of marginal scutellars and one strong decussate apical pair turned backward, disk

covered with erect hairs and bearing one pair of discal scutellars; three sternopleural macrochaetae; legs black; fore tibia with two median posterolateral bristles, midtibia bearing two or more median anterolateral bristles, one strong median inner ventral bristle; hind tibia evenly ciliate, with one longer median bristle; wing grayish hyaline, third vein with one or two bristles at base; squamae white.

Abdomen black covered with gray pollen except dorsum of first segment, which is shining black, apex of fourth segment and apical portions of segments 2 and 3 less pollinose and often blackish or subshining; the usual shining-black dorsal vitta obscure except on basal half of second segment; sides of second segment of males usually slightly rufous; no discal macrochaetae; first and second segments with a pair and third with a row of marginal macrochaetae; fourth covered with erect bristles more or less irregularly placed, about one-half size of macrochaetae on third segment; abdominal hairs of female subdepressed, in male more erect.

Length 9-12 mm.

Type locality.—West Medford, Mass.

Distribution.—Massachusetts 3, New York 4, New Jersey 3, Pennsylvania 1, District of Columbia 1, Virginia 1, Indiana 1, Missouri 1. Additional published records not duplicated above: Connecticut (Johnson), New York 4 (West), New Jersey (Weiss), Maryland 2 (Aldrich and Webber), New Mexico (Aldrich and Webber).

Type.—Male, U.S.N.M. No. 25705.

Hosts.—*Automeris io* (Fabricius) 21; *Agrotis ypsilon* (Rottemberg) 4; *Graptolitha innominata* (Smith) or *disposita* (Morrison) 1. Published record not duplicated in the above material: *Automeris io* (Fabricius) (Reinhard). Coquillett's record of rearing *Eworista eudryae* from *Acrionicta homamelis* Guénée (Koebele) belongs here; Townsend's description of the anal stigmata was drawn from a puparium on the same pin with fly labeled "389 Lo, Aug. 8, 82."

Remarks.—The foregoing description is based on male type and male paratype, reared from *Automeris io*, West Medford, Mass. (Riley; Coquillett records as *Eworista eudryae*); two male and two female paratypes reared from *Agrotis ypsilon*, Missouri (Riley; Coquillett records as *Eworista eudryae*); one female paratype, Lafayette, Ind. (Aldrich); one female paratype, Melrose, Mass., TD 395, (Townsend); one male paratype, Lehigh Gap, Pa. (Greene); 22 reared specimens bearing Gypsy Moth Laboratory note numbers, all but one reared from *A. io*; one male and two females collected by Aldrich, Greene, and Walton.

Adults, May to September; number per host, one to eight; generations, one; hibernation, as larvae in host pupa.

2. *CARCELIA INFLATIPALPIS* (Aldrich and Webber), new combination

Zenillia inflatipalpis ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 24-25, 1924.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.

This species resembles *Carcelia formosa* very closely, and in many of their characteristics they are identical. The principal points of difference are: Palpus swollen, apical portion destitute of fine black hairs with which the remainder of the palpus is sparsely clothed; a less pollinose, slightly more subshining species; erect discal bristles on second and third abdominal segments, which are distinctly larger and longer than the surrounding subdepressed abdominal hairs. Females of *C. formosa* have a very few weak, erect hairs in the discal region, but they are the same size as the surrounding subdepressed abdominal hairs.

The following characters are perhaps worth mentioning, otherwise the description is the same as for *formosa*: Head with front of female at narrowest 0.27 head width; frontal orbit, face, cheek, and posterior orbit silvery pollinose; antenna black, first and second joints not faintly reddish, third antennal segment two and one-half to three times length of second; arista tapering from base to apex.

Abdomen black, gray-pollinose, heavy pollen more confined to sides and bases of segments; dorsum of first segment and apical portion of other segments more or less shining black; no distinct abdominal dorsal vitta; in type specimen erect bristles in discal regions of second and third abdominal segments almost approaching small macrochaetae in size, this character not so pronounced in other specimens, but the erect bristles are larger and stronger than surrounding subdepressed abdominal hairs.

Length 9 to 10 mm.

Type locality.—Great Falls, Va.

Distribution.—Virginia 1, Indiana 1. Published record: New York (West).

Type.—Female, U.S.N.M. No. 25706.

Host.—Unknown.

Remarks.—The foregoing statements are based on the examination of the type, June 12 (Banks); the female paratype, Lafayette, Ind., September 14, 1917 (Aldrich); two females, Great Falls, Va., August 14, 1919 (Greene). The last two females were removed from the *Carcelia formosa* material where they were with a female of *C. formosa* (Greene) having the same date and locality.

3. *CARCELIA GNAVA* (Meigen)

This species closely resembles the genotype *Carcelia bombylans* Robineau-Desvoidy. For many years *C. gnava* of Macquart (nec Meigen) was accepted as the genotype. The complete Palearctic

synonymy is not given; sufficient is included to indicate the history of the species. For a more complete record, the reader is referred to Bezzi and Stein and to Lundbeck.

Tachina gnava MEIGEN, Systematische Beschreibung der Europäischen zweiflügeligen Insecten, vol. 4, pp. 156, 330, 1824.

Chetoliga gnava (Meigen) RONDANI, Dipterologiae Italicae prodromus, vol. 1, p. 66, 1856.

Carcelia gnava (Meigen) BEZZI and STEIN, Katalog der paläarktischen Dipteren, vol. 3, p. 236, 1907.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, p. 518, 1910.—VILLENEUVE, Feuille Jeun. Nat., ser. 5, vol. 42, p. 90, 1912.—ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 7, 1924.—LUNDBECK, Diptera Danica, pt. 7, p. 377, 1927.—BURGESS and CROSSMAN, U. S. Dept. Agr. Tech. Bull. 86, pp. 114–115, 1929.—BARANOFF, Institut für Hygiene und Schule für Volksgesundheit, Zagreb, Arb. parasit. Abt., No. 3, 1931.—BROWN, U. S. Dept. Agr. Circ. 176, pp. 13–14, 1931.

Carcelia processionae (Ratzeburg) STEIN, Arch. Naturg. Abt. A. Heft. 6, p. 66, 1924.

Carcelia bombylans of TOWNSEND (nec Robineau-Desvoidy), Manual of myiology, pt. 4, pp. 213–214, 1936.

Head with front of male at narrowest 0.21 to 0.22 (in three specimens) and in female 0.24 to 0.26 (in three specimens) of head width; frontal row of nine or ten bristles in male and seven to nine in female, extending from almost the end of second antennal segment to two reclinate upper frontals (preverticals); facial ridge bristly on lowest one-fourth; gena one-sixteenth or less eye height; frontal orbit grayish silvery white, face and posterior orbit silvery white, gena silvery gray; antenna black, third antennal segment of male three times and in female nearly three times as long as second; arista thickened on basal half, penultimate segment short; palpus yellow.

Thorax blackish, bluish-gray pruinose, marked by five black mesonotal vittae; four post-sutural dorsocentral macrochaetae; scutellum yellow, three pairs of marginal scutellars and one decussate apical pair turned backward, one pair of discal scutellars; two sternopleural macrochaetae; legs black, tibiae yellowish brown; fore tibia with two median posterolateral bristles; midtibia bearing two or more median anterolateral bristles, one inner ventral bristle; hind tibia more or less evenly ciliate, with one longer median bristle; wing grayish hyaline, third vein with two or three bristles at base.

Abdomen black covered with gray pollen except dorsum of first segment, narrow apical margins of other segments, and narrow dorsal vitta which are shining black; in male sides of segments 1, 2, and 3 broadly yellowish red, in female usually black; no discal macrochaetae; first and second segments usually with two pairs (sometimes three on second segment in male) of marginal macrochaetae,

sometimes one pair either weak or lacking; third segment with a marginal row; fourth covered with erect bristles hardly if at all longer than abdominal hairs of segments 2 and 3.

Length 8 to 10 mm.

Distribution.—Widely distributed throughout Europe. This species has been liberated in the northeastern part of the United States; as yet it has not been recovered.

Hosts.—*Stilpnotia salicis* (Linnaeus) (principal host, sometimes reaching a 35-percent parasitization), *Dasychira pudibunda* (Linnaeus) (overwintering host), *Malacosoma neustria* (Linnaeus) and *Parthetia dispar* (Linnaeus) (records from the Bureau's former Central European Parasite Laboratory, Budapest, Hungary). Published records: Baer and Lundbeck mention *Orygia antiqua* (Linnaeus) and *Arctia caja* (Linnaeus). *P. dispar* is a very rare and only an accidental host; the *Carecia* recovered from *dispar* is usually *separata* (Rondani). Howard and Fiske were discussing *C. separata* instead of *C. gnava*.

Remarks.—Description based upon an examination of 25 to 30 specimens from central Europe.

Adults, May to August; number per host, one to several; generations, two; hibernation, as larva in host larva; copulation time, 15 minutes.

The manner in which this species oviposits is a very interesting one. It has the habit of projecting its eggs or larvae through the air for a distance from one-half the length of the body of the adult up to at least one-half inch. It is not necessary for the female to come in contact with the host hairs, and the females can oviposit when the host larvae are crawling rapidly away from or past them. It was never determined whether the larva leaves the egg after it contacts the host hairs, whether the egg-shell is ruptured at the time of ejection, or whether the larva is ejected through the air with the eggshell attached. Many attempts were made to determine this peculiarity, but by the time the attacked larva was placed under the binocular, the parasite larva was always found crawling down the host hair; in every case the collapsed empty eggshell of the cylindrical, elongate type was found attached to a host hair somewhere near the outer extremity. It is believed that the egg is ruptured when ejected from the ovipositor, and that the larva passes through the air either partly emerged or with the eggshell attached.

In 1930 a small shipment of about 136 puparia of *Carecia* that were described as *gnava* reared from *Dasychira pudibunda* was sent to the Gypsy Moth Laboratory from Budapest, Hungary. A total of 80 adults were subsequently secured from these puparia. The species

proved to be *Carcelia rasa* Macquart (= *Sisyropa angusta* Brauer and Bergenstamm). This species belongs to the *bombylans* group which is distinguished by having only one median anterolateral bristle on the midtibia. It differs from *C. gnara* as follows: Head with front of male at narrowest 0.17 to 0.18 (in three specimens) and of female 0.20 (in three specimens) of head width; 13 to 15 frontal bristles in male and 7 to 11 in female which descend to even with arista; gena one-twentieth eye height; arista thickened on basal two-fifths.

Thorax more thinly pollinose, so that it is difficult to see the median mesonotal vitta; yellow color of male and female scutellum extending on to posterior portion of scutum.

Abdominal hairs of male about as long as macrochaetae, which causes marginals of second and third segments to appear more or less indistinct; usually only one pair of marginals on first abdominal segment.

This species has not been liberated in North America.

4. *CARCELIA RECLINATA* (Aldrich and Webber), new combination

Zenillia reclinata ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 32-33, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925.—ESSIG, Insects of western North America, p. 581, 1926.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—SCHAFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, pp. 112-113, 1934.

Zenillia eudryae of ALDRICH (nec Townsend), Proc. U. S. Nat. Mus., vol. 80, art. 20, p. 2, 1932.

Paraexorista reclinata (Aldrich and Webber) TOWNSEND, Manual of myiology, pt. 4, p. 211, 1936.

Carcelia reclinata is almost identical in appearance with the Palearctic species *Carcelia cheloniae* Rondani. The adults and puparia of both species can be separated. It is surprising that the name *C. cheloniae* was used to cover the material represented by *Carcelia malacosomae*, new species, and the introduced species *Carcelia luxifrons*, which are as easily separated from *C. cheloniae* as from *C. reclinata*.

Head with front of male at narrowest 0.20 to 0.24 (in five specimens) and of female 0.26 to 0.30 (in five specimens) of head width; frontal row of 11 or 12 bristles in male and 6 to 8 in female, extending from a little below base of third antennal segment to 2 reclinate upper frontals (preverticals); facial ridge bristly on about lowest one-fourth, sometimes ascending higher in males; gena one-twelfth or less eye height; frontal orbits silvery gray pollinose, gradually becoming blacker toward vertex, especially so in female; face, gena, and posterior orbit silver-gray pollinose; antenna black, third segment of male nearly four times and in female about three times length of second; arista thickened on basal one-third, penultimate segment usually a little longer than broad; palpus yellow, base infuscated.

Thorax black covered thinly with light-gray pollen marked by five black mesonotal vittae; four postsutural dorsocentral macrochaetae; scutellum testaceous covered with gray pollen, three pairs of marginal scutellars and one strong decussate apical pair turned backward, disk covered with erect hairs and bearing one pair of discal scutellars; two sternopleural macrochaetae; legs black, tibiae brownish or yellowish with base and apex inclined to be blackish on ventral side; front tibia with two median posterolateral bristles; midtibia bearing two median anterolateral bristles of about equal length, one inner ventral bristle; hind tibia ciliate, with one or two longer bristles; wing grayish hyaline, third vein usually with two bristles at base; squamae white.

Abdomen black, subshining, covered with gray pollen except dorsum of first segment, a narrow apical border on remaining segments, and an obscurely marked median dorsal vitta; gray pollen more pronounced basally and laterally on dorsum of segments; first segment with a pair, second with two pairs, and third with a row of marginal macrochaetae; discal portions of second and third segments with erect bristles, some of those on third approaching weak macrochaetae in size; fourth segment covered with erect bristles about one-half size of marginal macrochaetae on third segment; sides of first, second, and third segments rufous, females usually black but sometimes with a rufous spot on sides of second and third segments; hypopygium brownish black, inner forceps curving inwardly and tapering to a fine point (when viewed from behind distinctly separated), outer forceps stouter and decidedly shorter.

Length 7 to 10 mm.

Type and allotype localities.—Hell Canyon, Manzano National Forest, N. Mex.

Distribution.—Maine 5, New Hampshire 10, Massachusetts 9, Ontario 1, New York 2, New Jersey 2, Maryland 1, Virginia 1, North Carolina 1, Indiana 1, Texas 1, New Mexico 2, Utah 3, Arizona 1, Idaho 1, California 1. Additional published records not duplicated above: Vermont (Johnson), Rhode Island (Schaffner and Griswold), New York 2 (West).

Type.—Male, U.S.N.M. No. 25697.

Hosts.—*Estigmene acraea* (Drury) 113; *Diacrisia virginica* (Fabricius) 25; unidentified Arctiidae 8; *Phragmatobia assimilans* var. *franconia* Slosson 1.

Remarks.—The description is based on an examination of the type, allotype, two male paratypes, and one female paratype, Hell Canyon, N. Mex. (Townsend); one male and two female paratypes, Indian Spring, N. Mex. (Townsend); one female paratype, Great Falls, Va. (Townsend); two male paratypes, Tempe, Ariz. (Caffrey); one male

paratype, Tempe, Ariz. (Wildermuth); one female paratype reared from *Phragmatobia assimilians* var. *francoia*, Hymers, Ontario (Dawson); 143 reared specimens bearing Gypsy Moth Laboratory note numbers (3 males reared from *Estigmene acerata* are paratypes, Nos. 10016 (14 and E31); one male and one female reared from arctiid (Dinnick), removed from the *Sisypota calypso* material; one female reared from *E. acerata* Raleigh, N. C. (Brimley); seven males and one female (Aldrich, Townsend, Eddington); seven males and four females from Idaho, Utah, Texas, Arizona, and Maryland (Aldrich, Mitchell, Caffrey, Shannon), removed from the *Carcelia "cheloniae"* material. One specimen determined by Townsend as *Carcelia* was *reclinata*; this specimen has only three postsutural dorsocentral macrochaetae.

One male paratype of *Carcelia reclinata* with puparium from the Gypsy Moth Laboratory, June 16, 1916, is *C. larifrons* Villeneuve.

The puparia of *Carcelia reclinata* and *C. cheloniae* are alike in their major characteristics. The stigmal plates are about flush with the surface of the puparium, and they are distinctly not protuberant; the stigmal slits are plain. The stigmal plates of *C. cheloniae* are far above the longitudinal axis or subdorsally located, whereas in *C. reclinata* they are almost centered, being only slightly above.

E-sig records *Zenillia reclinata* as having been commonly reared from *Estigmene acerata* in New Mexico and Arizona. The material that the writer examined from Arizona and New Mexico consisted of collected specimens; none of it had been reared.

Adults, January to September (depending upon the climate); number per host, one to several; generations, two or more; hibernation, larva in host larva (the indications are that *Carcelia cheloniae* also hibernates in this manner).

5. CARCELIA MALACOSOMAE, new species

Errorista cheloniae of authors (nec Rondani).—COQUILLET, U. S. Dept. Agr. Div. Ent., Tech. Bull. 7, pp. 13, 92, 1897.—GIBSON, Ann. Rep. Ent. Soc. Ontario, 1911, p. 117.—TOTHILL, Can. Ent., vol. 45, p. 70, 1913.

Paracerrorista cheloniae of authors (nec Rondani).—HOWARD and FISKE, U. S. Dept. Agr., Bur. Ent., Bull. 91, pp. 257, 286, 299–300, 1911.—TOWNSEND, Proc. Ent. Soc. Washington, vol. 18, pp. 1–19, 1916.—THORPE, Biol. Rev., Cambridge Phil. Soc., vol. 5, No. 3, pp. 193–194, 1930.

Paracerrorista cheloniae of ALDRICH and WEBBER (nec Rondani).—TOWNSEND, Manual of myiology, pt. 4, p. 211, 1936.

Carcelia larifrons of THOMPSON (nec Villeneuve), Bull. Soc. Zool. France, vol. 48, pp. 165–170, 1923.

Zenillia cheloniae of authors (nec Rondani).—ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 31–32, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925; Biological Survey of Mount Desert region, The insect fauna, pt. 1, p. 201, 1927.—ESSIG, Insects of western North America, p. 581, 1926.—BURGESS and CROSSMAN, U. S. Dept. Agr. Tech. Bull. 86, pp. 136–138, 1929.

Zenillia protuberans of SCHAEFFNER and GRISWOLD (nec Aldrich and Webber), U. S. Dept. Agr. Misc. Publ. 188, p. 112, 1934.

Paraexorista protuberans of SCHAEFFNER and GRISWOLD (nec Aldrich and Webber).—TOWNSEND, Manual of myiology, p. 4, p. 213, 1936.

Carcelia cheloniae Rondani does not occur in the Nearctic realm. The previous use of the name as applied to the Nearctic fauna has been one of mistaken identity.

Carcelia malacosomae, a Nearctic species, and *Carcelia laxifrons*, an introduced and established Palearctic species, constitute a classical gem in the resemblance of species of these two realms. They have been considered morphologically inseparable by specialists of the family for the past three decades, principally under the name of *cheloniae*. The resulting confusion, coupled with the initial misidentification of the species, has provoked considerable argument and produced many interesting theories, some of which can well be dispensed with. Although the controversy is probably far from ended, it has afforded the writer considerable satisfaction in being able to clear up much of the existing confusion, and to define the status of these two species.

Head with front of male at narrowest 0.27 to 0.28 (in five specimens) and in female 0.30 to 0.33 (in five specimens) of head width; frontal row of the usual 10 to 12 bristles in the male and 6 to 8 in the female, extending from at least on a level with insertion of arista to two reclinate upper frontals (preverticals); facial ridge usually bristly on more than lowest one-fourth, often ascending to near middle, especially in males; gena one-fifteenth or less eye height; frontal orbit and face silvery gray pruinose; parafacial bearing a few discernible hairs on upper side just below frontals; these hairs rarely absent; antenna black, third segment three times second; arista thickened on basal one-fourth, penultimate segment short; palpus yellow.

Thorax varying from reddish brown on sides to black on dorsum, gray pollinose, usually marked with five discernible mesonotal vittae; four post-sutural dorsocentral macrochaetae; scutellum testaceous thinly covered with pollen, three pairs of marginal scutellars and one strong decussate apical pair turned backward, disk covered with erect hairs and bearing one pair of discal scutellars; two sternopleural macrochaetae; femora and tibiae yellowish brown, tarsi black; front tibia with two posterolateral bristles; midtibia bearing two or more median anterolateral bristles, one long bristle about the middle with one or more above, with usually none below but when present very small; midtibia with one inner ventral bristle; hind tibia ciliate, with one longer bristle.

Abdomen blackish, covered, including hind margins, with gray pollen, without sheen, sides yellowish red in male, black in female;

dorsal vitta obscure and not clearly marked especially on third segment when held in a light that does not allow reflection of pollen to vary on either side; first segment with a pair, second with two pairs, and third with a row of marginal macrochaetae; discal portions of the second and third segments with strong bristles or macrochaetae that tend to blend somewhat with the erect abdominal hairs; fourth segment covered with erect bristles about one-half size of marginal macrochaetae on third segment; hypopygium brownish to black, inner and outer forceps long and of even length, former straight and parallel except at apex, where they diverge slightly (when viewed from behind they appear fused for two-thirds their length).

Length 8 to 10 mm.

The stigmal plates on the puparium are protuberant.

Type and allotype localities.—Saugus and Dedham, Mass., respectively.

Distribution.—Maine 5, New Hampshire 8, Vermont 8, Massachusetts 16, Connecticut 3, Rhode Island 2, New York 1, New Jersey 5, Alberta 1. Published records not duplicated above: New Brunswick (Tothill), Maine (Johnson), Colorado 2 (Coquillett ms., Walton ms.), British Columbia (Tothill). Coquillett records New Hampshire, Michigan, Tennessee, Georgia, and California. The material that Aldrich and Webber recorded as being from Utah, Arizona, and Maryland has been transferred to *Carcelia reclinata*.

Type.—Male, U.S.N.M. No. 54154.

Hosts.—*Malacosoma disstria* Hübner 290, *Malacosoma americana* (Fabricius) 129, *Hemileuca maia* (Drury) and *lucina* Henry Edwards 2, *Hyphantria cunea* (Drury) 1, unidentified tenthredinid 1. Published and unpublished records not duplicated in above material: *M. disstria* (Tothill), *Datana integerrima* Grote and Robinson (Schaffner and Griswold). Owing to the confusion surrounding the previous identity of *Carcelia malacosomae*, the following published host records should be viewed with some suspicion until further evidence is assembled: *Arachnis picta* Packard (Coquillett), *Callaretia proxima* (Guérin-Méneville) (Coquillett), *Callaretia ornata* Packard (Tothill), *Archips argyrospila* (Walker) (Gill), *Turuptiana permaculata* (Packard) (Gillette). Tothill's record of *Phragmatobia assimilians* Walker probably refers to *Carcelia reclinata*.

Remarks.—The foregoing description was based on an examination of the following material (all previously determined as "*cheloniae*"): 421 specimens bearing Gypsy Moth Laboratory note numbers (including the following material reared from *Malacosoma disstria*: Type, 2 male and 1 female paratypes, No. 10001; 1 female paratype, 10001a; allotype and 1 female paratype, 10001c; 1 male paratype, 10081 J20; 1 male paratype, 11710 J1a. The following material

reared from *Malacosoma americana*: One female paratype, 10000G; 3 female paratypes, 10000i; 1 female paratype, 10070 C5; 1 male paratype, 10070 J23; 1 male paratype, 11701 J3a); and 14 field-collected specimens including 1 male and 2 female paratypes from Melrose Highlands, Mass. (Webber) and 1 male paratype from Blue Hills, Mass. (Webber).

Now that the identity is clear, the biology can be further discussed. It has been observed that this species emerges from hibernation about a week later in the spring than *Carcelia laxifrons* does. This would seem to be quite normal and natural, as the preferred hosts of *Carcelia malacosomae*, namely, *Malacosoma disstria* and *M. americana*, would have to develop from the egg to a suitable size for parasitization; whereas the preferred host of *C. laxifrons*, namely, *Nygmia phaeorrhoea*, which hibernates as a larva, would develop to a suitable size earlier. The males precede the females in emergence by a day or two and prefer to mate with the freshly emerged females. The average length of time spent in copulation is from 15 to 20 minutes. The elapsed time from copulation to commencement of oviposition is from 7 to 8 days. The egg hatches in from 45 minutes to 5 days after deposition, depending upon how far the larva has incubated at the time of oviposition. (The observation supports both Pantel's and Townsend's observation on *Carcelia cheloniae* and *C. laxifrons*.) A record of oviposition of 510 eggs was secured from an unfertilized female. The eggs are deposited anywhere on the dorsal hairs of the host and rarely on the skin. The larva hatches from the opposite end of the egg from which the pedicel is attached. After emerging from the egg, the larva continues its way down the side of the egg, along the hair upon which the egg was laid, until it reaches the body of the host. The larva then migrates to a suitable point of entrance into the host. The full-grown larva emerges from the host about 3 to 4 weeks after oviposition and pupates.

The following experiment was performed in the spring of 1926: Fertilized females of *Carcelia* obtained from *Malacosoma americana* deposited 60 eggs on 17 tent caterpillars (*M. americana*), 2 caterpillars lived to produce 3 puparia; 114 eggs were deposited on 36 browntail moth caterpillars (*Nygmia phaeorrhoea*) and no puparia were recovered although the caterpillars lived eventually to produce adult moths. The females oviposited with equal eagerness on either form, and all the eggs hatched. Subsequent taxonomic investigation substantiated this experiment. There has never been a *Carcelia* characterized in part by the yellowish femora (*malacosoma*) reared from any field-collected larvae of the brown-tail moth at the Gypsy Moth Laboratory.

Adults, late April to the middle of June; number per host, one to three; generations, one; hibernation, in the puparium (adult characters usually not formed until the following spring).

6. *CARCELIA PROTUBERANS* (Aldrich and Webber), new combination

Zenillia protuberans ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 15, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925.

Parexorista protuberans (Aldrich and Webber) TOWNSEND, Manual of myiology, pt. 4, p. 211, 1936.

This species is considered to be an atypic or aberrant form of *Carcelia malacosomae*, which it resembles in some of its characters. The male type and male paratype are peculiar in that instead of hibernating normally as puparia, they issue the same season. Both specimens are in poor shape, being badly rubbed, with some parts missing, and patched together with glue. The following notes are based on type material:

Type.—Head in good condition and agreeing with the description for *Carcelia malacosomae*. Thorax badly rubbed; middle and hind legs missing; one wing lacking. Abdomen attached with glue; dorsum badly rubbed; sides yellow on segments 1, 2, 3, and a little on 4, extending well up on dorsum and below on the venter.

Paratype.—Head in poor condition; hairs on the upper side of the parafacials located with the aid of the binocular high power. Thorax agreeing with *C. malacosomae*; midtibia with two median anterolateral bristles; hind tibia ciliate. Abdomen very yellow, extending farther up on dorsum and below on venter than in the type (fourth segment included).

Aldrich and Webber describe the abdomen as being "mostly yellow excepting a black vitta on the dorsum and a similar one on the venter." The amount of yellow color is far beyond that described for *Carcelia malacosomae*, in which the male abdomen is broadly black on the dorsum, with the sides rufous.

Type and paratype locality.—Rockingham, Vt.

Type.—Male, U.S.N.M. No. 25699.

Host.—*Malacosoma disstria* Hübner.

Remarks.—The two male specimens were reared at the Gypsy Moth Laboratory from material collected at Rockingham, Vt., June 12, 1915, by J. J. Culver, the flies issuing July 23–25, 1915.

7. *CARCELIA LAXIFRONS* Villeneuve

Parexorista lucorum BRAUER and BIRGENSTAMM (partim), Denkschr. Akad. Wiss. Wien, math.-nat. Kl., vol. 58, p. 322, 1891; vol. 60, p. 222, 1893.

Parexorista cheloniac of authors (nec Rondani).—TOWNSEND, U. S. Dept. Agr. Bur. Ent., Tech. Bull. 12, pt. 6, 1908; Ann. Ent. Soc. Amer., vol. 4, p. 135, 1911; Proc. Ent. Soc. Washington, vol. 13, p. 165, 1911; vol. 18, pp. 1–19, 1916.—THOMPSON, Journ. Econ. Ent., vol. 3, No. 3, pp. 283–295, 1910.—

HOWARD and FISKE. U. S. Dept. Agr., Bur. Ent., Bull. 91, pp. 91, 92, 136, 257, 286, 297-300, 310, 1911.

Carcelia laxifrons VILLENEUVE, Feuille Jeun. Nat., ser. 5, vol. 42, pp. 42, 90, 1912.—BAER, Zeitschr. Angew. Ent., vol. 7, p. 142 (108), 1921.—THOMPSON, Bull. Biol. France et Belgique, vol. 57, fasc. 2, p. 185, 1923; Ann. Parasitol. Humaine et Compar., vol. 4, No. 3, 1926.—CROSSMAN and WEBBER, Journ. Econ. Ent., vol. 17, p. 69, 1924.—LUNDBECK, Diptera Danica, pt. 7, p. 380, 1927.—BURGESS and CROSSMAN, U. S. Dept. Agr. Tech. Bull. 86, pp. 136-138, 1929.—THORPE, Biol. Rev., Cambridge Phil. Soc., vol. 5, No. 3, pp. 193-194, 1930.

Zenillia cheloniae of ALDRICH and WEBBER (nec Rondani), Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 31-32, 1924.

Paracorista laxifrons (Villeneuve) TOWNSEND, Manual of myiology, pt. 4, pp. 211-213, 1936.

This species was introduced into the New England States under the name *Paracorista cheloniae* (Rondani) and resembles very closely *Carcelia malacosomae*, which was considered previously also to be *Eucorista* or *Paracorista cheloniae* (Rondani). All the known differences are cited in the key to the species.

Distribution.—Widely distributed throughout Europe. *Carcelia laxifrons* has become established in New England. It has been recovered from many localities over practically the whole area infested by the brown-tail moth in Maine 2, New Hampshire 1, Massachusetts 8, and many other localities.

Hosts.—*Nygmia phaeorrhoea* (Donovan) 157; *Malacosoma americana* (Fabricius) 6 specimens bearing Gypsy Moth Laboratory note numbers, and 41 specimens labeled as being from this host but bearing no note numbers; *Malacosoma disstria* Hübner 5; *Porthetria dispar* (Linnaeus) 2. Lundbeck has published a European host record of *Dasychira fascelina* (Linnaeus) (Larsen).

Remarks.—The material examined consisted of 51 exotic specimens from Europe mostly reared from the brown-tail moth: 211 reared specimens bearing Gypsy Moth Laboratory note numbers except as indicated; 4 specimens bearing miscellaneous numbers from the Gypsy Moth Laboratory; one male labeled only "ex *M. americana*" removed from the *Sisyropa eudryae* material; one male with puparium labeled as paratype of *Carcelia reclinata*, U.S.N.M. No. 25627, Gypsy Moth Lab. VI-16-16; and 28 field-collected specimens. Practically all the above-mentioned specimens had been identified as *Zenillia "cheloniae"*.

The value of *Carcelia laxifrons* as a parasite of *Nygmia phaeorrhoea* in New England is highly dependent upon the climate, which on the average is more unfavorable because of its severity than in its more favored range in Central Europe. In this connection, it should be recalled that *C. laxifrons* emerges earlier in the spring than *Carcelia malacosomae*. Some of the most outstanding recoveries from the standpoint of numbers have been made from the Massachusetts

Cape Code area, which is milder, but at times the insect is plentiful over the whole area. One of the best records obtained is the rearing of 139 *C. laxifrons* from 200 brown-tail moth caterpillars collected at Lunenburg, Mass., in 1915.

A few specimens in the collection indicate that *Carcelia laxifrons* is rarely a parasite of *Malacosoma americana* and *M. disstria*. Mr. Webber has corroborated this under laboratory conditions by rearing puparia of *Carcelia laxifrons* (European stock) from *Malacosoma*.

Records by the writer indicate that *Carcelia laxifrons* and *Compsilura concinnata* (Meigen) have been obtained from field collections from the same host larva, *Nygmia phaeorrhoea*.¹⁴ In cases of severe competition between these two species, it is considered normally that *C. concinnata* has the best chance of survival; all conditions being equal, this should occur only when the attack by both forms on a single individual does not produce a case of excessive multiple superparasitism.

Adults, late April to June; number per host, one to three; generations, one; hibernation, in the puparium (adult characters usually not formed until the following spring).

As the biology of this species has been frequently discussed in literature, only a few additional remarks will be necessary. Under laboratory conditions, crossmating or interbreeding between *Carcelia laxifrons* and *Carcelia malacosomae* is obtained only with great difficulty, and there is probably little or no interbreeding in the field.

Mr. Webber has completed a series of most interesting laboratory experiments in which *Carcelia laxifrons* (European stock) and *C. malacosomae* have been crossmated. Larvae of the brown-tail moth and both species of *Malacosoma* have been subjected to attack by both crosses. Adult progeny of these crosses were subsequently secured. It is hoped that the results of this most interesting work and its resultant effect on the taxonomic feature of the two species will be made available in the near future.

8. CARCELIA SEPARATA (Rondani)

Carcelista separata RONDANI, D'ipterologie Italicae prodromus, vol. 3, pp. 134, 16, 1859.—BEZZI and STEIN, Katalog der paläarktischen Dipteren, vol. 3, p. 246, 1907.

¹⁴It has been observed in other instances that under equal conditions of competition and host selection, a species of Larvaevoridae capable of superparasitism can coinhabit the same host specimen along with another species which is also capable of superparasitism. Whereas when a species capable only of solitary parasitism (survival of one specimen) enters into competition to coinhabit the same host specimen with another species capable of either solitary or superparasitism, only one species will survive. Several instances have been noted where *Opsosturmia nidicola* Townsend (solitary parasite) was the successful survivor in a competition with *Compsilura concinnata* even though the larva of *C. concinnata* reached third-stage maturity before it succumbed.

- Carcelia gnava* of authors (nec Meigen).—HOWARD and FISKE, U. S. Dept. Agr., Bur. Ent., Bull. 91, pp. 88, 132, 231-232, 308, 1911.—CROSSMAN and WEBBER, Journ. Econ. Ent., vol. 17, pp. 67-76, 1924.
- Carcelia separata* (Rondani) VILLENEUVE, Feuille Jeun. Nat., ser. 5, vol. 42, p. 89, 1912.—BAER, Zeitschr. Angew. Ent., vol. 7, p. p. 142 (108), 1921.—STEIN, Arch. Naturg., Abt. A, Heft. 6, p. 65, 1924.—BURGESS and CROSSMAN, U. S. Dept. Agr. Tech. Bull. 86, pp. 114-115, 1929.—BARANOFF, Institut für Hygiene und Schule für Volksgesundheit, Zagreb, Arb. parasit. Abt., No. 3, 1931.—BROWN, U. S. Dept. Agr. Circ. 176, p. 13, 1931.
- Senometopia separata* (Rondani) TOWNSEND, Manual of myiology, pt. 4, p. 200, 1936.

Head with front of male at narrowest 0.24 to 0.25 (in three specimens) and in female 0.27 to 0.29 (in three specimens) of head width; frontal row of 9 to 12 bristles in male and 5 to 7 in female, extending from a little below base of third antennal segment to 2 reclinate upper frontals (preverticals); facial ridge bristly on lowest one-fifth to one-fourth; gena one-fifteenth or less eye height; frontal orbit silvery gray, face and posterior orbit silvery white; gena grayish silvery white; antenna black, third segment three times as long as second; arista thickened on basal one-third, penultimate segment short; palpus yellow.

Throax black, silvery-gray pruinose; marked by four mesonotal vittae, median one lacking; four postsutural dorsocentral macrochaetae; ground color of scutellum yellow covered with this silvery pollen, three pairs of marginal scutellars and one decussate apical pair turned backward, one pair of discal scutellars; two sternopleural macrochaetae; legs black with tibia yellowish brown; fore tibia with one median posterolateral bristle; midtibia with one medium anterolateral bristle, inner ventral bristle lacking; hind tibia ciliate, with one longer bristle; hind coxa bare behind; wing grayish hyaline, third vein with two or three bristles at base.

Abdomen black covered with silvery pollen including shoulders of first segment; dorsal vitta very obscurely marked except on segment 2, black; in male sides of second segment red, female black; no discal macrochaetae, in female on third segment (rarely on second) 2 or 3 hairs or bristles slightly stronger than rest; first segment with 1 pair of marginal macrochaetae; second segment in male with 1 pair, in female usually 2 pairs of marginal macrochaetae; third segment with a row of marginal macrochaetae; fourth segment covered with erect bristles about one-half size of macrochaetae.

Length 8 to 9 mm.

Distribution.—Central and southern Europe. This species has been liberated in the northeastern part of the United States, but as yet it has not been recovered.

Hosts.—*Porthetria dispar* (Linnaeus) (summer host). Hibernating hosts: *Pterostoma palpinum* (Linnaeus), *Pheosia tremula*

(Clerck), *Acronicta aceris* (Linnaeus). It has been brought through hibernation in laboratory-attacked material on *Colocasia coryli* (Linnaeus), *Abrostola tripartita* (Hufnagle), *Phalera bucephala* (Linnaeus), and *Abrostola triplasia* (Linnaeus). The records are from the Bureau's former Central European Laboratory, Budapest, Hungary.

Remarks.—The description is based on an examination of a large series of European material comprising over 34 males and 40 females, 7 of which were determined by Dr. Villeneuve.

Adults. May to August; number per host, one to several; generations, two; hibernation, as larva in host larva.

9. *CARCELIA LAGOA* (Townsend), new combination

Exorista lagoae TOWNSEND, Ent. News, vol. 2, p. 159, 1891.

Exorista flavirostris of authors (nec Van der Wulp).—COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 100, 1897.—REINHARD, Ent. News, vol. 33, p. 72, 1922.—BISHOPP, U. S. Dept. Agr., Circ. 288, p. 13, 1923.

Carcelia flavirostris of JOHNSON (nec Van der Wulp), Diptera of Florida, 1913. *Zenillia amplexa* of ALDRICH and WEBBER (nec Coquillett) partim, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 13, 1924.

This species is more like *Carcelia formosa* than *C. amplexa*. The genitalia resembles those of *C. formosa* and *C. diacrisiae*.

Head with front of male at narrowest 0.23 to 0.25 (in three specimens) and in female 0.25 to 0.27 (in three specimens) of head width; frontal row of seven or eight bristles in male and five to eight in female, extending from junction of second and third antennal segments to two strong reclinate upper frontals (preverticals); facial ridge bristly on lowest one-sixth; gena one-sixteenth or less eye height; frontal orbit, face, cheek, and posterior orbit light-gray-silvery pollinose; first, second, and upper portions of third segment of antenna red (this varies to all black), third segment from four to four and one-half times second; arista thickened on basal one-third, penultimate segment short; palpus yellow.

Thorax black covered with light-gray pollen: male with four and female with five narrow black mesoanal vittae, median one obsolete before suture in female and apparently entirely so in male; four post-anal dorso-ventral macrochaetae; scutellum yellow covered with gray pollen, three pairs of marginal scutellars and one strong decussate apical pair turned backward, one pair of discal scutellars; three sternopleural macrochaetae; legs with tarsi black, tibiae and femora varying from yellow to nearly black but always concolorous; fore tibia with one median posterolateral bristle; midtibia with one median anterolateral bristle, one strong inner ventral bristle; hind tibia ciliate with one longer bristle; wing grayish hyaline, third vein with two or three bristles at base; squamae white.

Abdomen reddish yellow sparsely covered with light-gray-silvery pollen (color varying to almost black with red color showing only faintly; the pollen then more pronounced silvery); a median dorsal vitta shining black (not so pronounced in the darker form), covering whole depression on first segment in red forms (this segment entirely black in dark forms), nearly as wide as width beneath pair of marginal macrochaetae on second segment, and narrow on third segment (must be closely observed in red specimens to avoid wrong impression), broadening sharply on fourth segment; ventral membrane shining black; no discal macrochaetae, abdominal hairs depressed; first and second segments with one pair of marginal macrochaetae (pair on first segment sometimes weak or lacking in male); fourth segment irregularly tipped with marginal and submarginal bristles about one-half size of macrochaetae of marginal row on third segment.

Length 8 mm.

Type locality.—Guanajuato, Mexico.

Distribution.—District of Columbia 1, North Carolina 1, Florida 5, Mississippi 1, Texas 3, Mexico 1. Published records not duplicated above: Texas 2 (Reinhard), Virginia (Coquillett), Mexico (Townsend), Jamaica (Johnson).

Hosts.—*M. golioppyge opercularis* (Ablat and Smith) 9; *M. (Lagoa) crispata* Packard 1 probably *opercularis*, *Lagoa* sp. 2. Coquillett lists all the specimens reared from *opercularis* and *crispata* as *opercularis*. Townsend reared the type specimens from *M. (Lagoa) opercularis*. Other published rearing records are *M. opercularis* (Reinhard, Bishopp).

Remarks.—The foregoing description is based on an examination of eight males and two females reared from *Megaloppyge opercularis* (Hayhurst, Neal, McMeekin, Schwarz, Turner, Spencer and Weed, as listed by Coquillett); one female reared from *Lagoa* sp. (Riley); one male reared from *Lagoa* sp., North Carolina; one male and six puparia, host not listed, District of Columbia; one female, Federal District, Mexico (Conradi); two specimens from Florida bearing No. 3373.

Coquillett determined 10 and possibly 11 of the foregoing specimens as *Erorista flavirostris*, as indicated by the characters in his key in 1897. This species can be recognized from Van der Wulp's original description as not being *E. flavirostris*.

Aldrich's notes indicate that he twice examined the remnant of the type specimen *lagone* Townsend. The type was in very poor condition, with the head lacking, front and hind legs gone, and thorax and abdomen injured by glue. Aldrich considered the specimen to be *amplexa*, and he refused to alter the nomenclature for such a poor specimen. His examination indicated that the specimen had four and

three postsutural dorsocentrals, and three acrostical macrochaetae; sternopleural macrochaetae probably three; midtibiae with one median anterolateral bristle and one inner ventral bristle; no discal macrochaetae.

This material must be removed from *Carcelia amplexa*, and *Carcelia lagoae* covers the requirements of the species. Although the major morphological characters are the same, the author is perplexed by the variation in color between the light and dark forms. While the extreme limits are readily separable, no clear-cut demarcation could be found for the intermediate specimens.

Adults. June to October, although many of Coquillett's specimens issued during the winter months; number per host, one to several; hibernation, in the host larva or cocoon; generations, uncertain as to number.

10. *CARCELIA FLAVIROSTRIS* (Van der Wulp), new combination

Exorista flavirostris VAN DER WULP, Biologia Centrali-Americana, Diptera, vol. 2, p. 69, 1890.

Zenillia amplexa of ALDRICH and WEBBER (nec Coquillett), partim, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 13, 1924.

Head with front of male at narrowest 0.24 and in female 0.26 (one specimen) of head width; frontal row of eight or nine bristles in male and six in female, extending from base of third antennal segment to two reclinate upper frontals (preverticals); outer vertical bristle present in female, lacking in male; facial ridge bristly on lowest one-half; gena one eighteenth eye height; frontal orbit, face, and posterior orbit silvery-white pollinose, frontal orbit and upper half of posterior orbit tinged with yellow, giving a slight brassy appearance; antenna black, nearly reaching oral cavity, third segment of male over five times and in female four times second; arista thickened on basal one-fourth and located almost at base of third antennal segment, penultimate segment short; palpus yellow.

Thorax black-gray pollinose; marked with four black mesonotal vittae; four post-sutural dorsocentral macrochaetae; scutellum mostly black tipped with reddish yellow, three pairs of marginal scutellars and one apical pair, one pair of discal scutellars; two sternopleural macrochaetae; legs black: fore tibia with one median posterolateral bristle; midtibia with one median anterolateral bristle, one small inner ventral bristle; hind tibia ciliate, with one longer bristle; third vein of wing with two bristles at base, squamae white.

Abdomen black covered with light-gray pollen; first segment, posterior third of second and third segments, posterior half of fourth segment, and narrow dorsal vitta shining black; abdominal hair depressed on second and third segments in female; fourth segment with a row of discal macrochaetae, pollen of fourth interrupted at this

point; first and second segments with one pair of marginal macrochaetae, third with a marginal row of macrochaetae, and fourth tipped with marginal bristles; fourth segment of male with a striking thatch or dense group of bristles on sides extending straight back.

Length 7.5 to 8 mm.

The puparium resembles that of *Carcelia reclinata*.

Type series localities.—Orizaba (Veracruz) and Teapa (Tabasco), Mexico.

Distribution.—Puerto Rico 1, Mexico 2.

Type series.—British Museum.

Hosts.—"Larva on calabash tree" 4, *Megalopyge krugii* Dewitz 1.

Remarks.—The description is based on an examination of one male and three females reared from "larva on calabash tree" in January 1912 (Hooker); one female reared from *Megalopyge krugii* (Van Zwalenburg).

The writer had the privilege of examining the type series of *Exorista flavirostris* Van der Wulp in the British Museum. This series consisted of one male and two females, which varied as follows from the foregoing description: Male with six frontal bristles, female with six varying from five to seven; facial ridge bristly on lowest one-third; one female lacked the brassy tinge to parafrontals, which were slightly blackish toward vertex (junction of second and third antennal segments of this female reddish).

Thorax bluish-silvery-gray pollinose, male with shoulders and extreme sides golden pollinose, one female faintly golden-pollinose and other female lacking golden tinge; scutellum yellow, blackish in one female; male with one strong and one weak sternopleural macrochaetae on one side and only one on other.

Abdomen with golden tinge to pollen; abdominal hairs suberect in male. The female that lacked the brassy tinge to the parafrontals lacked the golden tinge to the pollen of the thorax and abdomen.

The discrepancies are minor in character, and the writer questions the desirability at this time of considering the Puerto Rican specimens other than *Carcelia flavirostris*.

11. CARCELIA DIACRISIAE, new species

Zenillia n. sp. (4) SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 113, 1934.

Although a larger fly, this species resembles *Carcelia perplexa*. It differs in having the legs and abdomen wholly black, the front tibia with only one long posterolateral bristle instead of two, and the dorsal vitta obscure except on the basal half of the second segment. The genitalia of the two forms are very distinct. The puparia are different.

Male (type).—Head with front at narrowest part 0.23 head width; frontal row of nine bristles, extending from on a level with middle of second antennal segment to two strong reclinate upper frontals (pre-verticals); facial ridge bristly on lowest one-sixth; gena less than one-fifteenth eye height; frontal orbit, face, cheek, and posterior orbit silvery-gray pollinose; antenna black, third segment five times as long as second; palpus yellow.

Thorax shining black covered with gray pollen; five black mesonotal vittae, median one obsolete before suture, inner pair well defined, outer pair interrupted at suture; four postsutural dorsocentral macrochaetae; scutellum black, faintly yellow, on apical half covered with gray pollen, three pairs of marginal scutellars and one strong decussate apical pair directed backward, disk covered with erect hairs and bearing one pair of discal scutellars; two sternopleural macrochaetae; legs wholly black; fore tibia with one median posterolateral bristle; middle tibia with one median long stout anterolateral bristle, one long inner ventral bristle; hind tibia ciliate, with one longer bristle near middle; wing grayish hyaline, third vein with two to three bristles at base, squamae white.

Abdomen black, wholly covered with gray pollen except dorsum of first segment, which is shining black, usual black dorsal vitta obsolete except on basal half of second segment; first and second segments with a marginal pair, third and fourth with a marginal row of macrochaetae; no discals.

Hypopygium rufous; inner forcep in profile long and tapering, outer side strongly and evenly curved from tip to base, inner side if divided into sevenths tapering abruptly on sixth portion to form a tooth out of seventh; outer forceps two-thirds length of inner, strongly appressed against inner side of inner forceps, in profile sides of outer forceps parallel, ending bluntly, apical one-third thickly beset with numerous small spines (viewed under binocular high power).

Length 10 mm.

Female (allotype).—Front at its narrowest part 0.24 head width; frontal row of six bristles, extending upward from on a level with base of third antennal segment; two pairs of fronto-orbital bristles; third segment of antenna slightly less than four times second; arista thickened on basal one-fourth; penultimate segment short. Pulvilli one-half length of those of male; base of third vein with one or two bristles. Fourth segment of abdomen lacking macrochaetae, covered with erect bristles about one-half size of macrochaetae on third segment. Except for hypopygium, remainder of description same as for male.

Length 10 mm.

The paratype material varies as follows from the descriptions: Width of male front 0.22 to 0.23, female 0.24 to 0.25; frontal bristles in male seven to eight, in female five to six; two male paratypes with three sternopleurals on one side; one female paratype with two median posterolateral bristles on fore tibiae.

Type locality.—Lafayette, Ind.

Allotype locality.—Somerville, N. J.

Distribution.—New Jersey 1, Maryland 2, Virginia 1, Indiana 1.

Type.—Male, U.S.N.M. No. 54150.

Hosts.—*Diacrisia virginica* (Fabricius) 3, *Estigmene acrea* (Drury) 1, 2 unknown hosts bearing Riley note numbers.

Remarks.—The material examined consisted of type, September 15, 1917 (Aldrich), allotype (No. 11715 L3C), male paratype (No. 11715 L4), female paratype (No. 11715 L3) reared from *Diacrisia virginica*, Somerville, N. J. (Gypsy Moth Laboratory); one male paratype 491 L—491 L^o (Riley); one male paratype 2906", February 21, 1887; four male paratypes and two female paratypes, Lafayette, Ind. (Aldrich); one male paratype, Dead Run, Fairfax County, Va., June 22, 1915 (Shannon); one reared specimen bearing Gypsy Moth Laboratory note number; and three males and two females (Aldrich, Shannon, and Palmer).

Three of the paratype specimens had been previously determined by Tothill as *griseomicans*. These three specimens are not Van der Wulp's concepts of *griseomicans*. See comments under *Carcelia amplexa*, Remarks.

Adults, May to September: number per host, one; generations, two; hibernation, in puparium.

12. CARCELIA AMPLEXA (Coquillett), new combination

Exorista amplexa COQUILLET, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, pp. 97-98, 1897.—THOMPSON, Journ. Econ. Ent., vol. 3, p. 291, 1910; Psyche, vol. 17, No. 5, pp. 210-211, 1910.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, p. 25, fig. 61 (puparium), 1922.—HILL, U. S. Dept. Agr. Dept. Bull. 1336, p. 17, 1925.

Exorista griseomicans of COQUILLET (nec Van der Wulp), U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 98, 1897.

Sisyrropa hemerocampae TOWNSEND, Ann. Ent. Soc. Amer., vol. 2, p. 248, 1909; Proc. Ent. Soc. Washington, vol. 14, pp. 165-166, 1912; Ann. Ent. Soc. Amer., vol. 8, p. 89, 1915.

Zenillia amplexa (Coquillett) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 13-14, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 161, p. 814, 1928.—SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 111, 1934.

Oreoxorista amplexa (Coquillett) TOWNSEND, Manual of myiology, pt. 4, p. 211, 1936.

Oreoxorista hemerocampae (Townsend) TOWNSEND, Manual of myiology, pt. 4, p. 211, 1936.

Head with front of male at narrowest 0.20 to 0.23, usually 0.21, and in female 0.24 to 0.27, mostly 0.24, of head width; frontal row of seven to nine bristles in male and five to seven in female, extending from apex of second antennal segment to two strong reclinate upper frontals (preverticals); facial ridge bristly on lowest one-sixth; gena less than one-fifteenth eye height; frontal orbit, face, cheek, and posterior orbit light-gray-silvery pollinose; third segment of antenna black, first and second segments varying from red to black but usually red, third segment four and one-half times second in male and four times in female; arista thickened on basal one-fourth, penultimate segment short; palpus yellow.

Thorax black usually gray-pollinose although quite often with a tawny tinge; five black mesonotal vittae, the median one obsolete before the suture; three or four postsutural dorsocentral macrochaetae, usually four, sometimes three on one side and four on the other; scutellum yellow covered with gray pollen, three pairs of marginal scutellars and one smaller but strong decussate apical pair turned backward, disk with one pair of discal scutellars; two sternopleural macrochaetae; legs with tarsi black; tibiae, femora, and coxae yellow, concolorous; fore tibia with two median posterolateral bristles; mid-tibia with one median anterolateral bristle, inner ventral weak or lacking, usually present, shorter than and situated on a level with or nearer the tarsus than the lower of the two median posterolateral bristles; hind tibia evenly ciliate, with one longer bristle near middle; wing grayish hyaline, third vein with one or two bristles at base, squama white.

Abdomen covered with gray pollen, sometimes with a tawny tinge except on dorsum of first segment and the very narrow (pencil line) dorsal vitta; although somewhat obscured by pollen, ground color of venter and sides reddish yellow extending up onto dorsum somewhat on first, second, third, and sometimes basal portions of fourth segment; ground color of dorsum, usually entire fourth segment, and ventral membrane black; first and second segments with a pair and third with a marginal row of macrochaetae, fourth segment covered with erect bristles about one-half size of macrochaetae on third; usually without discals, but over 10 percent of specimens examined had a nicely formed pair on third segment, and 2 specimens out of 90 had a pair of discals on second as well as on third segment; one specimen lacked marginal pair of macrochaetae on second segment.

Length 7 to 9 mm.

Type locality.—Mount Washington, N. H.

Distribution.—Maine 1, New Hampshire 1, New York 2, New Jersey 5, Pennsylvania 1, Ontario 1. Published records not duplicated above: Massachusetts (Townsend, Johnson, Schaffner and Griswold),

Rhode Island (Johnson, Schaffner and Griswold), Connecticut (Schaffner and Griswold), New York 4 (West), New Jersey (Smith), District of Columbia (Coquillett, Townsend), Maryland (Hill), Kansas (Tucker), Quebec (Winn and Beaulieu), Puerto Rico (Wolcott). Owing to the confusion surrounding the earlier identity of this species, the author is of the opinion that some of the above recorded published records may be erroneous.

Type.—Female, U.S.N.M. No. 3596.

Hosts.—*Hemerocampa leucostigma* (Abbot and Smith) 90; *Notolophus antiqua* (Linnaeus) 1, *Porthetria dispar* (Linnaeus) 1. Published records: *Plathyphenia scabra* (Fabricius) (Hill) and *Epantheria eridanus* (Cramer) (Wolcott).

Remarks.—The foregoing description is based on an examination of the type specimen; the female type, *Sisyropa hemerocampae*, U.S.N.M. No. 12623, G.M.L. 820-0 07TD 2060 B, previously determined as *Erorista griseomicans* by Coquillett; 90 reared specimens bearing Gypsy Moth Laboratory note numbers; one male reared from *Notolophus leucostigma* (Schoene); two females G.M.L. 558 T (one without ocellar bristles); one male and three females, 205¹⁴⁷ July 1896 labeled as *griseomicans*; one male and one female, 5332 B and 5332 BC, female labeled *griseomicans*; two males and one female, G.M.L. 2685 A, August 1909, labeled as *S. hemerocampae*; one male, 205¹¹³, July 23, 1897; one female, Toronto, Ontario (Brodie).

The species as now constituted is still a variable one. The main variable factors are the color of the first two segments of the antenna being red or black, three or four dorsocentrals, and the inner ventral bristle of the midtibia being weakly present or lacking. As there is no clear line of demarcation, nothing is to be gained by recognizing these variations as having specific status. The writer was unable to find any correlation between these factors or any others noted that would warrant further restricting the material placed here.

Adults, June to October; number per host, one; generations one or two depending upon the locality; hibernation, in the puparium.

In the past there has been a tendency to refer some specimens of *Carcelia amplexa* and *C. diacrisiae* to *Erorista griseomicans* Van der Wulp. The writer had the privilege of examining the type series of *E. griseomicans*, which is located in the British Museum. This material is a composite series composed of three species of *Carcelia* which resemble, but are distinct from *C. formosa*, *C. guava*, and *C. lagoae*.

13. CARCELIA PERPLEXA, new species

Zenillia amplexa of ALDRICH and WEBBER (nec Coquillett), partim, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 13-14, 1924.

Zenillia n. sp. (2) (partim) SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 113, 1934.

This species closely resembles *Carcelia amplexa*. The species is less variable, and several small characters serve to differentiate it from *C. amplexa*. It does not have the concolorous femora and tibiae.

Male (type).—Head with front at its narrowest 0.22 head width; frontal row of 11 bristles, extending from base of third antennal segment to three reclinate upper frontals (one reclinate upper frontal and two preverticals); numerous fine hairs outside row of frontal bristles; facial ridge bristly on lowest one-fifth; gena less than one-fifteenth eye height; frontal orbit, face, cheek, and posterior orbit silvery-gray pollinose with a tinge of black; antenna black, third segment four times second; arista thickened on basal one-fourth, penultimate segment short; palpus yellow.

Thorax black covered with gray pollen; five black mesonotal vittae, median one obsolete before suture; four postsutural dorso-central macrochaetae; scutellum yellow covered with gray pollen, three pairs of marginal scutellars and one smaller but strong decussate pair turned backward; disk covered with erect hairs and bearing one pair of discal scutellars; two sternopleural macrochaetae; legs with tarsi, femora, and coxae black; tibia yellow; fore tibia with two median posterolateral bristles; midtibia with one anterolateral bristle, one inner ventral bristle at least as long as and situated higher on tibia toward femur than the lower of the two median posterolateral bristles; hind tibia ciliate with one longer bristle near middle; wing grayish hyaline, third vein with two bristles at base; squamae white.

Abdomen covered with gray pollen except on dorsum of first segment and narrow vitta; although somewhat obscured by pollen, ground color of sides reddish yellow on first, second, and third segments extending on to venter and dorsum somewhat; ground color of dorsum and venter, including ventral membrane, and entire fourth segment black; first and second segments with a pair and third with a marginal row of macrochaetae; no discals; fourth segment covered with erect bristles about one-half size of macrochaetae on third; abdominal hairs erect

Length 8 mm.

Female (allotype).—Front at its narrowest 0.25 head width; six frontal bristles on one side, seven on other, only two reclinate upper frontal bristles (preverticals); hairs outside frontal row noticeable but not quite so numerous as in male; two pairs of fronto-orbital bristles; facial ridge bristly on lowest one-sixth; third segment of antenna slightly less than four times second. Reddish-yellow area on side of abdomen not so extensive as in male. The pulvilli one-half length of those of male. Otherwise the description is the same as for the male.

Length 8 mm.

The paratype material differs as follows from the descriptions: Front of male from 0.20 to 0.24 but usually 0.22, female from 0.24 to 0.26; frontal bristles from 8 to 13 but usually 10 or 11 in male, from 5 to 8 but usually 6 or 7 in female; male usually with 3 reclinate upper frontals; facial ridge bristly on lowest one-fifth; third joint of antenna from three and one-half to four times second. Wing with from 1 to 3 bristles at base of third vein but usually 2.

Length 5.5 to 8 mm.

Type and allotype locality.—Trenton, N. J.

Distribution.—Maine 2, Massachusetts 4, Connecticut 1, New York 3, New Jersey 2.

Type.—Male, U.S.N.M. No. 54151.

Hosts.—*Hemerocampa leucostigma* (Abbot and Smith) 26; *Olenoplagiata* (Walker) 1.

Remarks.—Material examined consisted of the following reared specimens bearing Gypsy Moth Laboratory note numbers: Type and allotype, No. 11718 N3i; three male paratypes, 11718 N3i; one male paratype, Trenton, N. J., No. 11718R1h; three male paratypes, Brooklyn, N. Y., Nos. 11718 K1d, 11718 K1 and 21, 11718 N1j; one female paratype, Trenton, N. J., No. 11718 N3j; two female paratypes, Brooklyn, N. Y., No. 11718 A3; one female paratype, Brooklyn, N. Y., No. 11718 N1o; one female paratype, Somerville, N. J., No. 11718 H7; one female paratype, Everett, Mass., No. 12108 L1; one female paratype, Berlin, Conn., No. 12108 R5; nine reared specimens bearing Gypsy Moth Laboratory note numbers; one male, 205⁴²⁹ April 14, 1896; one female G. M. L. 2603C, May 16, 1910.

Although the writer can readily separate this species from *Carcelia amplexa* on characters that have proved specific elsewhere in the genus *Carcelia*, he is perplexed by the coincidence that practically all the specimens of both series have been reared from the common host *Hemerocampa leucostigma*. As both species were previously considered one, it is perhaps desirable to cite this common host relationship. Subsequent material may indicate even more divergent lines of host selection.

Adults, May to July; number per host, one to several; generations, one; hibernation, in the puparium.

14. CARCELIA OLENENSIS, new species

Zenillia amplexa of ALDRICH and WEBBER (nec Coquillett), partim, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 13–14, 1924.

Zenillia n. sp. (2), partim, SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 113, 1934.

This species can be easily confused with *Carcelia perplexa*.

Male (type).—Except as otherwise noted, the description is the same as for the type male of *Carcelia perplexa*. Frontal row of seven and nine bristles, extending from base of third antennal segment to two reclinate preverticals, facial ridge bristly on the lowest one-sixth; frontal orbit, face, cheek, and posterior orbit silvery-gray pollinose.

Thorax black, thinly covered with gray pollen with marked bluish tinge; midtibia with inner ventral bristle lacking; third vein of wing with one bristle at the base.

Abdomen (type greasy, pollen pattern taken from paratype) thinly covered with light-gray pollen with a decided bluish tinge; first segment, apical margin of second and third segments, and dorsal vitta shining black; ground color predominantly black with reddish-yellow area on sides of the first, second, and third segments; one pair of weak discal macrochaetae on third segment; abdominal hairs on discal region long, fine, and erect.

Length 8 mm.

Female (allotype).—Front at its narrowest 0.28 head width; six frontal bristles on one side, seven on the other, two pairs of frontal orbital bristles; facial ridge bristly on the lowest one-eighth; third segment of antenna about three and one-half the second. Midtibia with inner ventral bristle; pulvilli one-half length of those of male; third vein of wing with two bristles at the base. Abdomen black, a very small and faint reddish yellow spot on side; no discal macrochaetae on third segment. Otherwise the description is the same as for male.

Length 8 mm.

The paratypes differ as follows from the descriptions: Front of male 0.20 and 0.21; frontal bristles usually eight in the male, from four to eight, averaging six, in the female. Male midtibia with a small or weak inner ventral bristle; third vein of wing with one or two bristles at the base. No discal macrochaetae on third segment of abdomen; one female with a black abdomen and one female with a reddish-yellow area on sides.

Length 7 to 9 mm.

Type and allotype locality.—Saugus, Mass.

Distribution.—Massachusetts 3.

Type.—Male, U. S. N. M. No. 54152.

Host.—*Olene atomaria* (Walker) 12.

Remarks.—Material examined consisted of the following reared specimens bearing Gypsy Moth Laboratory note numbers: Type and one male paratype, No. 10093 L1; allotype, two male paratypes, and one female paratype, No. 10093 L3; one female paratype, Weston, Mass., No. 10093 J7; three males and two females (all headless), Bolyston, Mass., No. 10093 J5.

Adults, June; number per host, one to several; generations, one; hibernation, in the puparium.

15. *CARCELIA YALENSIS*, new species

Zenillia amplexa of ALDRICH and WEBBER (nec Coquillett) (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 13-14, 1924.

Zenillia n. sp. (2) (partim), SCHAEFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 113, 1934.

This species is most easily confused with *Carcelia perplexa* and *C. diacrisiae*. The male, which is most likely to be confused with *C. perplexa*, is separated only by the blacker abdomen and the lack of reclinate frontal bristles other than the two reclinate preverticals. In the female the black abdomen and the two pairs of marginal macrochaetae on the second segment serve to separate this species from *C. perplexa*; while the fore tibia with two posterolateral bristles, second segment of the abdomen with two pairs of marginal macrochaetae, narrow dorsal vitta, and apical margins on segments 2 and 3 readily separate this species from *C. diacrisiae*.

Female (type).—Head with front at narrowest 0.30 head width; frontal rows of eight bristles, extending from below arista to two reclinate upper frontals (preverticals), frontal bristles on parafacial situated halfway between facial ridges and eye margin; facial ridge bristly on lowest one-fifth; gena less than one-fifteenth eye height; frontal orbit, face, and posterior orbit light-gray-silvery pollinose; antenna black, third segment slightly more than three times second; arista thickened on basal two-fifths, penultimate segment short; palpus yellow.

Thorax covered with gray pollen; five black mesonotal vittae; four postsutural dorsocentral macrochaetae; scutellum yellow, three pairs of marginal scutellars and one decussate apical pair, one pair of discal scutellars; two sternopleural macrochaetae; legs with tarsi and femora black, tibiae brown (yellowish); fore tibia with two median posterolateral bristles; midtibia with one median anterolateral bristle, one strong inner ventral bristle; hind tibia ciliate, with one longer bristle near middle; wing with two to three bristles at base of third vein; squamae white.

Abdomen black covered with thin light-gray pollen, heavier on sides and bases of segments; first segment, narrow apical margin of second and third segments, and narrow dorsal vitta shining black; first segment with one pair, second with two pairs, and third with a row of marginal macrochaetae; fourth segment covered with erect bristles one-half size of macrochaetae of third segment; no discal macrochaetae; hairs erect on discal areas, depressed on sides of second segment, and suberect on sides of third.

Length 8 mm.

Male (allotype).—Head with front at narrowest 0.24 head width; frontal row of 9 or 10 bristles, extending from on a level with arista to 2 reclinate preverticles; facial ridge bristly on lowest one-sixth; gena one-fifteenth eye height; frontal orbit, face, and posterior orbit light silvery-gray pollinose; antenna black, third segment four times second; arista thickened on basal one-third, penultimate segment short. Pulvilli long. Abdomen black, covered with gray pollen, second segment with one pair of marginal macrochaetae; abdominal hairs erect. Otherwise the description is the same as for the female.

Length 6.5 mm.

The female paratype material differs as follows: Front 0.27 to 0.29; frontal bristles from five to seven, usually six; third joint of antenna from three and one-quarter to four times the second. Abdomen black, more heavily covered with gray pollen.

Length 8 to 9 mm.

Type and allotype localities.—Yale, Idaho, and Altmar, N. Y.

Distribution.—Maine 1, New Hampshire 1, Massachusetts 1, New York 1, Idaho 1, California 1.

Type.—Female, U.S.N.M. No. 54153.

Hosts.—*Notolophus antiqua* (Linnaeus) 5, *Hemerocampa leucostigma* (Abbot and Smith) 1, *Halisidota tessellaris* (Abbot and Smith) 2, cocoon of caterpillar on *Abies concolor* 2.

Remarks.—Material examined consisted of the female type, Yale, Idaho, July 28, 1927 (Aldrich) and the following reared specimens bearing Gypsy Moth Laboratory note numbers: Allotype, No. 12109 N11; one female paratype, Everett, Mass., 12108 K6; one female paratype, Bangor, Maine, 12109 M7a; one female paratype, Altmar, N. Y., 12109 N11; one female paratype, Duane, N. Y., 12109 P6; one female paratype, Claremont, N. H., 12131 D8; one headless female, 12109 J9; one badly rubbed and battered male, 11757 H6; and one male and one female, Signal Peak, Mariposa County, Calif., December 1907 (Miller).

4. Genus *APLOMYA* Robineau-Desvoidy

- Aplomya* ROBINEAU-DESVOIDY, Mém. Acad. Sci. Inst. France, vol 2, p. 184, 1830; Histoire naturelle des diptères des environs de Paris, vol. 1, p. 459 [on page 460 (*A. zonata* Robineau-Desvoidy) = *Tachina confinis* Fallen], 1863.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, pp. 509, 553, 1910.—TOWNSEND, Manual of myiology, pt. 3, p. 231, 1936. [Genotype, (*A. zonata*) = *Tachina confinis* Fallen. By designation of Robineau-Desvoidy, 1863, in synonymy.]
- Huebneria* ROBINEAU-DESVOIDY, Ann. Soc. Ent. France, p. 601, 1847; Histoire naturelle des diptères des environs de Paris, vol. 1, p. 279 [(*Carcelia nigripes* Robineau-Desvoidy) = *Tachina affinis* Fallen], 1863.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, p. 553, 1910.—TOWNSEND, Manual of myiology, pt. 4, pp. 209, 212, 1936. [Genotype, (*C. nigripes*) = *Tachina affinis* Fallen. By designation of Robineau-Desvoidy, 1863, in synonymy.]

Exorista of authors (nec Meigen) COQUILLETT (partim), U. S. Dept. Agr. Div. Ent., Tech. Bull. 7, p. 91, 1897.—BAER (partim), Zeitschr. Angew. Ent., vol. 7, p. 112, 1921.—STEIN (partim), Arch. Naturg., Abt. A., Heft 6, p. 67, 1924.—LUNDBECK (partim), Diptera Danica, pt. 7, p. 307, 1927.—BARANOFF (partim), Institut für Hygiene und Schule für Volksgesundheit, Zagreb, Arb. parasit. Abt. No. 3, 1931.

Zenillia of authors (nec Meigen).—BAER (partim), Zeitschr. Angew. Ent., vol. 7, p. 118, 1921.—ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 1-43, 1924.—LUNDBECK (partim), Diptera Danica, pt. 7, p. 337, 1927.

Collatia CURRAN, Families and genera of North American Diptera, p. 464, 1934.—TOWNSEND, Manual of myiology, pt. 4, p. 224, 1936. (Genotype, *Zenillia submissa* Aldrich and Webber. Monotypic.) (New synonymy.)

Inasmuch as *Exorista* Meigen has been restricted to *larvarum* and its congeners, *Aplomya* is the oldest name available to represent roughly the generic equivalent of *Exorista* of authors (s. s.), Baer, Lundbeck, etc., or a limited portion of *Exorista* of authors (s. l.), Stein, Baranoff, etc. The species now referred to *Aplomya* that were known to Aldrich and Webber in 1924 were placed in three of the four subgenera of their composite genus *Zenillia*. *Huebneria* has been accepted as a synonym of *Aplomya* by some of the best authorities. *Huebneria* represents a transitional phase between *Paracxorista* and *Aplomya*; it has some characteristics of both. Curran, in establishing the genus *Collatia* on the character of "the propleura haired on the middle portion," has contradicted his opinion that "In many genera the propleura is haired but in some this character is not reliable." The writer believes that the best procedure is to leave *Collatia submissa* (Aldrich and Webber) in the genus *Aplomya*. Townsend places *Aplomya* in the tribe Phrynoini, *Huebneria* in the tribe Carceliini, and *Collatia* in the tribe Lydellini. *Aplomya* exhibits probably a more heterologous composition than any of the other genera proposed in this paper. The bionomic relationships are more obscure than they are in the other genera previously discussed.

Aplomya can be separated without difficulty from *Phryxæ*, *Thelymyia*, and *Chrysophryxæ*. In *Aplomya* the front at the vertex is one-third or less the width of the head; the front is narrower in the male than in the female, with somewhat diverging margins; and the claws and pulvilli are more elongate in the male than in the female. *Carcelia* will not be confused with *Aplomya*, as in the latter genus the eye does not occupy the whole side of the head; the gena is at least one-tenth the eye height, usually more; and there are always three or four sternopleural macrochaetae. The following characters will readily serve to differentiate *Aplomya* from *Sisypopa*: Scutellum with three pairs of marginal scutellars and an apical pair; hind tibia usually with unequal bristles, sometimes weakly ciliate in some species. A little practice should enable one to separate *Aplomya* and

Zenillia, but caution is advised in order that mistakes may be avoided. In *Aplomya* the abdomen is of ordinary form.

All the species of *Aplomya* possess an inner ventral bristle on the mid tibia. *Aplomya affinis* and *A. estigmenensis* of this genus have two bristly hairs behind on the apex of the hind coxa. All the other species lack these bristly hairs excepting *Aplomya epicydes*, in which they are present on some of the specimens.

The following grouping of the species placed in *Aplomya* is suggested for those workers who prefer or insist on restricted genera or a definition of species groups:

1. *confinis*, *theclarum* (*Aplomya*).
2. *mitis*, *caesar*, *confusionis*.
3. *trisetosa*.
4. *submissa* (*Collatia*).
5. *affinis*, *helvina crassiscia*, *estigmenensis* (*Huebneria*).
6. *epicydes*, *imitator*, *trichiosomae*.
7. *fronto*, *phcosiae*, *cerurae*, *neurotomae*.
8. *setinervis*.
9. *polita*.

The first four groups are the most characteristic of *Aplomya*, but they have distinctive characters of their own. Groups 5 and 6 are closely related and are characteristic of *Huebneria*. Groups 8 and 9 are very similar in many respects.

KEY TO THE SPECIES OF APLOMYA

There are 20 species included in the key, 17 of which occur in the Nearctic and 3 in the Palearctic realm. Inasmuch as *Aplomya mitis* has been released in the northeastern and north-central parts of the United States, it is included in the key. *Aplomya confinis* and *A. affinis* are included because the names have been utilized to refer to indigenous Nearctic species in our literature for the past 40 to 50 years. It was considered that the inclusion of the 3 Palearctic species would increase the systematic value of the key and eliminate possible confusion as to the usage of these specific names.

1. Sternopleural macrochaetae three----- 4
 Sternopleural macrochaetae four----- 2
2. Postsutural dorsocentral macrochaetae four; scutellum reddish yellow, black at base; apical scutellars curved backward, decussate; no discal bristles or macrochaetae on second and third abdominal segments----- 3
 Postsutural dorsocentral macrochaetae three; middle portion of propleura hairy; scutellum black; apical scutellars erect or proclinate, decussate; front at vertex very narrow; one pair of discal macrochaetae on second and third abdominal segments (male only)
 1. *submissa* (Aldrich and Webber) (p. 75)
3. Disk of scutellum covered with long, fine, erect hairs; with a discernible pair of discal scutellars (Palearctic species)----- 2. *confinis* (Fallen) (p. 75)

Disk of scutellum covered with long, fine, erect hairs; there is a tendency to lack a discernible pair of discal scutellars (Nearctic species)

3. *theclarum* (Scudder) (p. 76)

4. Postsutural dorsocentral macrochaetae four----- 7
 Postsutural dorsocentral macrochaetae three----- 5

5. Palpus yellow; costal spine short----- 6
 Palpus brownish yellow; costal spine long; front at vertex about one-third width of head, of about equal breadth in both sexes; third segment of antenna hardly twice length of second; arista thickened on more than basal one-half, penultimate segment elongate; pulvilli of male only slightly longer than pulvilli of female----- 4. *trisetosa* (Coquillett) (p. 78)

Palpus black, costal spine short; arista thickened on basal one-fourth to one-third, penultimate segment short

8. *crassisetata* (Aldrich and Webber) (p. 84)

6. Middle tibia with three or more median anterolateral bristles; three sternopleural macrochaetae; scutellum rufous, black at base; apical scutellars strong, more or less erect; discal macrochaetae on second and third abdominal segments somewhat numerous and irregularly arranged; third segment of antenna about twice length of second

{Nearctic species) 5. *estigmenensis*, new species (p. 79)
 {Palearctic species) 6. *affinis* Fallen (p. 81)

Middle tibia with one median anterolateral bristle; third vein bristly to small cross vein; two sternopleural macrochaetae and a sternopleural bristle; scutellum black; apical scutellars weak; no discal macrochaetae on second or third abdominal segments; third segment of antenna more than three times the second----- 7. *setinervis* (Coquillett) (p. 83)

7. Palpus yellow ----- 12
 Palpus black or predominantly so----- 8

8. Scutellum black; apical scutellars turned backward----- 9
 Scutellum yellow on apical half and black on basal half; apical scutellars erect or proclinate; subapical scutellar bristles very long, reaching to third abdominal segment----- 8. *crassisetata* (Aldrich and Webber) (p. 84)

9. Several small hairs on upper part of parafacial situated directly below lowest frontal bristles; two pairs of discal macrochaetae or bristles on second and third abdominal segments, anterior pair often weaker; one reclinate prevertical bristle, female sometimes with two----- 11

Small hairs directly below lowest frontals lacking; one pair of discal macrochaetae on second and third abdominal segments; two reclinate prevertical bristles ----- 10

10. Midtibia with one median anterolateral bristle; third segment of antenna in male four and one-half and in female four times length of second segment; arista thickened on basal one-third, penultimate segment about as long as broad----- 9. *neurotomae*, new species (p. 85)

Midtibia with two or three median anterolateral bristles; third segment of antenna in male three and one-half and in female twice length of second; arista thickened on basal one-third to two-fifths, penultimate segment long----- 10. *confusionis*, new species (p. 86)

11. Parafrontal, face, and gena silver-gray pollinose (some specimens with a distinct tawny or brassy tinge to parafrontal) in female, with parafrontal becoming blacker toward the vertex; front at narrowest in male about 0.25 and in female 0.29 head width; third segment of antenna in male four and in female three times length of second segment; arista thickened on basal two-fifths in male, on basal one-third in female, penultimate segment elongate

(more noticeably so in male); some tendency exhibited, especially in the specimens from leaf-rollers, for upper of two median anterolateral bristles on midtibia to be less than one-half length of lower bristle. Female with one strong reclinate prevertical, often with uppermost frontal bristle reclinate, the females from *Pyrausta nubilalis* often with additional smaller preverticals----- 11. *caesar* (Aldrich) (p. 88)

Parafrontal, face, and gena blackish-smoky-gray pollinose in male, silver gray in female, with parafrontals becoming blacker toward vertex (parafrontal never with a distinctive tawny or brassy tinge); hairs, at least in male, larger and more profuse outside and below frontal bristles; front at narrowest in male about 0.22 and in female about 0.31 head width; third segment of antenna in male three and in female two and one-half times length of second segment; arista thickened on basal one-third, penultimate segment short, at most hardly longer than broad; midtibia with at least two median anterolateral bristles, the upper being more than half length of lower, females especially with an additional small bristle above upper bristle. Female with at least two strong reclinate preverticals located definitely outside row of frontal bristles; a darker species, not so heavily pollinose as *caesar*, pollen of second abdominal segment confined more to the base and sides----- 12. *mitis* (Meigen) (p. 90)

12. Discal macrochaetae or bristles on both second and third abdominal segments either regularly or irregularly arranged----- 14

No discal macrochaetae or bristles on second and usually lacking on third abdominal segment----- 13

13. Parafrontal silvery pollinose, blacker toward vertex; thorax and abdomen shining black, thinly silvery-gray pollinose at most; midtibia with one median anterolateral bristle; no discal bristles; first and fourth abdominal segments shining black; a little patch of dense hairs on the sides of the third and fourth segments (male only)---- 13. *polita* (Coquillett) (p. 90)

Parafrontal golden-pollinose; thorax and abdomen predominantly golden-pollinose; midtibia with two median anterolateral bristles; third segment (in some females) varying from no discals to a pair of discal macrochaetae sometimes irregularly placed; dorsum of all four segments golden-pollinose.

14. *helvina* (Coquillett) (p. 91)

14. Midtibia with one median anterolateral bristle, sometimes with a smaller additional bristle above; third segment of antenna four or more times the length of second----- 17

Midtibia with two or three median anterolateral bristles; third segment of antenna not over twice length of second----- 15

15. Front at vertex one-fourth head width in male; hypopygium with inner forceps long and tapering----- 16

Front at vertex less than one-fifth head width in male and barely more than one-fourth head width in female; hypopygium with tip of inner forceps curved backward, outer forceps about four-fifths length of inner forceps; 9-12----- 15. *epicydes* (Walker) (p. 92)

16. One reclinate prevertical bristle; black, gray-pollinose species; hypopygium with large inner forceps long, straight, and tapering, outer forceps wider, four-fifths length of inner forceps; 12 mm. (male only)

16. *imitator*, new species (p. 93)

Two reclinate prevertical bristles; black, subshining; very thinly gray-pollinose species; hypopygium with inner forceps similar to that of *imitator* but more concave on outer side and not a great deal longer than outer forceps; 8.5 mm. (male only)----- 17. *trichiosomae*, new species (p. 94)

17. Scutellum black, the tip sometimes yellow; gena one-sixth to one-fifth eye height----- 18
Scutellum yellow covered with gray pollen; gena one-tenth eye height; third segment of antenna six times length of second (male only)
cerurae, new species (p. 94)
18. Parafrontal and parafacial brassy, facial depression and posterior orbit silvery pollinose----- 19. pheosiae, new species (p. 95)
Parafrontal and face gray-pruinose----- 20. fronto (Coquillett) (p. 96)

1. *APLOMYA SUBMISSA* (Aldrich and Webber), new combination

Zenillia submissa ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 31, 1924.

Collatia submissa (Aldrich and Webber) CURRAN, Families and genera of North American Diptera, p. 464, 1934.—TOWNSEND, Manual of myiology, pt. 4, p. 224, 1936.

Head with front at narrowest 0.15 to 0.16 head width; row of frontal bristles long, extending from below base of third antennal segment to three or four reclinate preverticals; facial ridge bristly on lowest one-fourth to one-third; gena one-tenth eye height; frontal orbit and face gray-pruinose; antenna black, third segment two and one-fourth times second; arista thickened on basal one-third, penultimate segment elongate; palpus black.

Thorax black, gray pollinose, marked with four mesonotal vittae: mid tibia with two median anterolateral bristles; hind tibia subciliate; wing hyaline, small crossvein infuscated, third vein with two or three bristles at base.

Abdomen black, gray pollinose; first and second segments with a pair and third with a row of marginal macrochaetae; fourth segment with marginal and submarginal bristles about three-fourths the length of the macrochaetae on third segment.

Length 7 mm.

Type locality.—Koehler, N. Mex.

Distribution.—New Mexico 1, Alberta 1.

Type.—Male, U.S.N.M. No. 25696.

Host.—Unknown.

Remarks.—Description based on the type male collected August 14, 1913 (Walton), and one male collected August 29, 1926, Cameron Lake, Alberta (King).

2. *APLOMYA CONFINIS* (Fallen) (genotype)

Tachina confinis FALEN, Monographia muscidum sueciae, p. 32, 1820.—MEIGEN, Systematische Beschreibung der europäischen zweiflügeligen Insecten, vol. 4, pp. 274, 396, 1824.—ZETTERSTEDT, Insecta Lapponica, p. 64, 1838; Diptera Scandinaviae, vol. 3, p. 1140, 1844.

Aptomyia confinis (Fallén) ROHNEAU-DESVOIDY, Mém. Acad. Sci. Inst. France, vol. 2, p. 184, 1830; Histoire naturelle des diptères des environs de Paris, vol. 1, p. 459-460, 1863.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, pp. 509, 553, 1910.—TOWNSEND, Manual of myiology, pt. 2, p. 60, 1935; pt. 4, p. 231, 1936.

Errorista confinis (Fallen) RONDANI, Dipterologiae italicæ prodromus, vol. 3, p. 143, 1859.—BEZZI and STEIN, Katalog der paläarktischen Dipteren, vol. 3, p. 241, 1907.—BAER, Zeitschr. Angew. Ent., vol. 7, p. 147 (113), 1921.—MÜLLER, Arch. Naturg., vol. 88, p. 125, pl. 111, 1922.—STEIN, Arch. Naturg., Abt. A, Heft. 6, p. 75, 1924.—THOMPSON, Ann. Parasitol., Humaine et Compar., vol. 4, p. 216, figs. 6, 18, 1926.—LUNDBECK, Diptera Danica, pt. 7, p. 312, 1927.—BARANOFF, Encycl. Ent. Diptera, vol. 4, p. 36, 1927.—WAINWRIGHT, Trans. Ent. Soc. London, 1928, p. 185.

The reason why this species has been commonly reported as occurring in North America is that it has been confused with *Aplomya theclarum*. Townsend has expressed the opinion that *A. confinis* does not occur in North America. The writer considers that this is another example of the resemblance of species between the Nearctic and Palearctic realms.

Admittedly there is a paucity of characters upon which the separation of *Aplomya confinis* and *A. theclarum* is based. Other than the difference cited in the key, there appear to be additional small differences between the two species. Owing to the scarcity of European specimens, it is difficult to evaluate the systematic worth of the noted differences.

Male with ten frontal bristles descending to middle of parafacials; facial ridge bristly one-fourth in male, one-fifth in female; gena one-seventh eye height in female; palpus black, brownish toward tip. Third vein with three bristles at base. A decidedly larger fly than *theclarum*.

Distribution.—Europe from middle Scandinavia and Finland down into Africa.

Hosts.—Bezzi and Stein, Baer, and Lundbeck list *Aporia crataegi* (Linnaeus); *Thecla ilicis* (Esper), *Zephyrus quercus* (Linnaeus), *Callophrys rubi* (Linnaeus), *Tephroclystia* sp., and *Rhyparia purpurata* (Linnaeus).

Remarks.—Comments based on an examination of one male collected on July 15 at Rambouillet, France, by Villeneuve, and one female collected at Kelenvoelgy, Hungary, September 6, 1927, by Muesebeck.

Lundbeck stated that the palpi of *confinis* were "yellow, brownish toward the base." Baer and Stein called the palpi of their specimens black.

The species is oviparous, depositing an oval egg, flattened below, on the skin of the host.

3. *APLOMYA THECLARUM* (Scudder), new combination

Tachina theclarum SCUDDER, Can. Ent., vol. 19, p. 166, 1887.

Errorista theclarum (Scudder) WILLISTON, Scudder's Butterflies of Eastern United States and Canada, vol. 3, p. 1920, fig. 17, 19, 1889.—TOWNSEND, Trans. Amer. Ent. Soc., vol. 22, p. 75, 1895; Psyche, vol. 7, p. 330, 1896.

Exorista chrysophani TOWNSEND, Ent. News, vol. 2, p. 197, 1891.

Exorista confinis of authors (nec Fallen) COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 97, 1897.—SMITH, Catalogue of New Jersey insects, p. 780, 1909.—REINHARD, Ent. News, vol. 32, p. 72, 1921.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, p. 11, fig. 21 (puparium), 1922.

Zenillia confinis of authors (nec Fallen) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, pp. 35-36, 1924.—JOHNSON, List of New England Diptera, p. 197, 1925; Proc. Boston Soc. Nat. Hist., vol. 38, p. 87, 1925; Biological survey of Mount Desert, The insect fauna, pt. 1, p. 201, 1927.—ESSIG, Insects of western North America, p. 581, 1926.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—REINHARD, Texas Agr. Exp. Stat. Bull. 401, pp. 33-34, 1929.—ALDRICH, Proc. U. S. Nat. Mus., vol. 80, art. 20, p. 2, 1932.

Head with front of male at narrowest 0.25 to 0.28 (in five specimens) and in female 0.31 to 0.33 (in five specimens) of head width; frontal row of six to eight bristles in male and five to six in female, extending from on a level with well below arista to two reclinate preverticals; male with very weak and female with outer vertical bristle; facial ridge bristly on lowest one-third in male, one-fourth in female; gena one-fifth to one-sixth eye height, silver-gray; parafrontal and face silvery pollinose; antenna black, third segment in male four and one-half and in female three times length of second; arista thickened on basal one-half, penultimate segment elongate; palpus black, rarely partially yellow.

Thorax black, thinly gray pollinose in male, more noticeably pollinose in female; marked with five mesonotal vittae; midtibia usually with three median anterolateral bristles, the middle bristle longest, the lower one shortest, often very small in male; hind tibia subciliate; wing grayish hyaline, third vein with two bristles at base; squamae whitish.

Abdomen black and shining; first segment shining black; in male often obscurely rufous at the sides of second and third segments, second thinly gray pollinose with only a narrow hind margin and dorsal vitta black, third and fourth segments polished black with only a very narrow, interrupted silvery band at extreme base of third; in female, second segment with broader black hind margin and with pollinose band on third segment as broad as that on second, fourth segment wholly polished black except extreme base laterally; first segment with a pair, second often with four, and third with a row of marginal macrochaetae; no discal macrochaetae; fourth segment irregularly covered with bristles; abdominal hairs erect.

Hypopygium black, inner forceps shorter than outer, a few fine hairs on outer side, in profile decidedly concave on hind edge; outer forceps nearly straight, ending in a blunt point.

Length 5 to 8 mm.

Type locality.—Unknown.

Distribution.—Maine 1, New Hampshire 3, Massachusetts 11, Connecticut 1, New Jersey 3, Pennsylvania 1, Maryland 2, District of Columbia, Virginia 8, Louisiana 1, Indiana 1, Idaho 1, Colorado 1, New Mexico 3, Arizona 1, California 3, Ontario 1. Published and unpublished records not duplicated above: Maine (Johnson), New York 12 (West), New Jersey 6 (Smith), Kansas (Snow), Iowa (Townsend), Texas 9 (Reinhard), Colorado (Gillette), New Mexico (Cockerell), Arizona (Coquillett), Quebec (Winn and Beaulieu).

Cotype.—Male, U.S.N.M. No. 1421.

Hosts.—*Strymon calanus* Hübner 2, *Brephidium exilis* (Boisduval), 1, *Lycaena* sp. 1, lycaenid larva on *Sedum stenopetalum* 1, larva on apple 1. Published and unpublished records not duplicated above: *Lycaena dione* (Scudder) (Townsend), *Lycaena thoe* (Guérin-Ménéville) (Fletcher), *Plebeius melissa* (Edwards) (Gillette), *Brephidium exilis* (Boisduval) (Cockerell), *Strymon falacer* (Godart) (Scudder), *Lycaenopsis pseudargiolus* (Boisduval and LeConte) (Williston), Coquillett lists *Gloveria howardi* (Dyar) (Toumey) and *Lycaena xanthoides* (Boisduval) (Skinner), *Strymon melinus* Hübner (Reinhard).

Remarks.—The foregoing description was based on an examination of the following material: 2 male cotypes reared from *Strymon calanus*; 1 male bred from *Atriplex canescens* on which there were larvae of *Brephidium exilis* (Cockerell); 1 male, no. 3919, District of Columbia, May 24, 1886 (Pergande); 1 male from red lycaenid larva on *Sedum stenopetalum*, Boulder Canon, Colo., June (Cockerell); 1 male from larva on apple, Arlington, Mass., June 27, 1884 (Dimmock); and 186 collected specimens.

Adults, May to September. Adults have been taken on the flowers of *Ceanothus americanus* and *Tephrosia virginiana*.

4. *APLOMYA TRISETOSA* (Coquillett), new combination

Exorista trisetosa COQUILLETT, Proc. U. S. Nat. Mus., vol. 25, p. 110, 1902.

Zenillia trisetosa (Coquillett) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 29, 1924.

Frontal row of bristles extending from on a level below arista to one or two reclinate preverticals; frontals descending almost to meet bristles on facial ridge, which is bristly on lowest one-fourth to one-third; gena one-third eye height; parafrontal black, very thinly gray pollinose (side view), face gray pruinose, gena shining black below impression.

Thorax black, lightly covered with bluish-gray pollen; five mesonotal vittae; apical scutellars rather long, turned backward; midtibia with two or three median anterolateral bristles; hind tibia not ciliate; wing hyaline, third vein slightly sinuate, with three or four bristles at base.

Abdomen black, subshining, first segment black, remaining segments whitish pollinose at base; first segment with a weak pair, second with a pair, and third with a row of marginal macrochaetae; second and third segments with a pair of discal macrochaetae; fourth segment covered with macrochaetae.

Length 5 to 8 mm.

Type locality.—Moscow, Idaho.

Distribution.—Idaho 2, Montana 1, Colorado 3, Nevada 1, New Mexico 1, Washington 1, Pennsylvania 1. Published record, Illinois 1.

Type.—Male, U.S.N.M. No. 6212.

Hosts.—*Autographa californica* (Speyer) 1; *Loxostege commixtalis* (Walker) 2. Published record: Aldrich and Webber list, from Walton's manuscript, *Nephelodes emmedonia* (Cramer) (Kahl).

Remarks.—The material examined consisted of the male type, a male paratype, and a female paratype, August 26, 1895, Moscow, Idaho (Aldrich); 2 male paratypes, Lewiston, Idaho (Aldrich); one male ex *Autographa californica*, Edgar, Montana; one male ex *Loxostege commixtalis* (Maxson), Longmont, Colo., 1916; one male ex *L. commixtalis*, Fort Collins, Colo., July 30, 1932; collected specimens, six males and one female (Baker, Aldrich, Walton, Harbeck).

Adults, May to August.

5. *APLOMYA ESTIGMENENSIS*, new species

Exorista affinis of authors (nec Fallen) COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, pp. 12, 94, 1897.—ADAMS, Williston's Manual of North American Diptera, p. 358, fig., 1908.—TOTHILL, Can. Ent., vol. 45, p. 70, 1913.

Zenillia affinis of authors (nec Fallen) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 34–35, 1924.—JOHNSON, List of New England Diptera, p. 197, 1925; Biological survey of Mount Desert region, The insect fauna, pt. 1, p. 201, 1927.—ESSIG, Insects of western North America, p. 581, 1926.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 111, 1934.

Tachina affinis (Aldrich and Webber) (nec Fallen), TOWNSEND, Manual of myiology, pt. 4, p. 212, 1936.

Male (type).—Head with front at narrowest 0.26 head width; frontal row of 11 or 12 bristles irregularly arranged, extending from on a level with well below arista to 2 reclinate preverticals; very weak outer vertical bristle; facial ridge bristly on lowest one-fourth; gena one-seventh eye height, blackish-gray pollinose; parafrontal and face silvery-black pollinose; antenna black, third segment twice length of second; arista thickened on basal one-fourth, penultimate segment elongate, at least as long as broad; palpus yellow.

Thorax black, subshining, thinly covered with gray pollen; five black mesonotal vittae; apical half of scutellum rufous, basal half black; apical scutellars strong, suberect; legs black, pulvilli long; midtibia

with four median anterolateral bristles, two inner ventral bristles; hind tibia unevenly ciliate; wing grayish hyaline, two bristles at base of third vein; squamae white.

Abdomen black, subshining, lightly covered with gray pollen; sides of second segment rufous; dorsum of first segment and a narrow posterior border on remaining segments shining black; when viewed from in front, thin layer of pollen more pronounced basally and laterally on dorsum of segments; first and second segments with a pair and third with a row of marginal macrochaetae; second and third segments with discal macrochaetae; irregularly arranged; fourth segment covered with erect bristles, some of bristles in discal area approaching one-half size of macrochaetae on third segment; abdominal hairs depressed on second segment, erect on third.

Length 8 mm.

Female (allotype).—Front of head at narrowest 0.28 head width; eight and nine frontal bristles, three preverticals; outer vertical bristle; gena one-eighth eye height; parafrontal silvery black, becoming blacker toward vertex; arista thickened on basal one-third. Thorax black, subshining, more noticeably pollinose than male. Abdomen black, subshining, more noticeably pollinose; dorsal vitta on basal half of second segment; second and third segments with one pair of roughly arranged discals and additional discal bristles.

Length 8 mm.

The paratype material varies from the descriptions as follows: Male front 0.24 and female front 0.28 to 0.31 head width; frontal bristles seven to nine, one male with three preverticals on one side, one female with only two preverticals, and one female with four; gena one-eighth eye height. Scutellum mostly rufous, black at base. Second and third segments with from one roughly arranged pair of discals to several discals more or less irregularly arranged.

Length 6 to 9 mm.

The puparia of *Aplomya estigmenensis* and *A. affinis* are alike in their major characteristics. The roughly triangular shaped stigmal plates are about flush with the surface of the puparium, and they are distinctly not protuberant; the three stigmal slits are plain, the bottom one nearly horizontal. There is a slight, crater-shaped, oval elevation at the base of the two stigmal plates which in *A. affinis* is distinctly wider in diameter than the distance between the two stigmal plates; whereas in *A. estigmenensis* this is smaller, the width of the diameter being about equal to the distance between the two plates. The stigmal plates of *A. affinis* are far above the longitudinal axis or subdorsally located, while in *A. estigmenensis* they are almost centered, being only slightly above. With the exception of the promi-

nence at the base of the stigmal plates, the puparia of *A. estigmenensis* are very similar to those of *Carcelia reclinata* (Aldrich and Webber).

Type and allotype locality.—Hartford, Vt.

Distribution.—Maine 1, New Hampshire 3, Vermont 1, Massachusetts 7, Rhode Island 1, Montana 1, Colorado 2. Published records not duplicated above: Ontario 2 (Coquillett, Tothill); Aldrich lists Idaho 1, Utah 1, and Colorado 1; Minnesota (Washburn); Maine (Johnson); ? New York 2 (West).

Type.—Male, U.S.N.M. No. 54143.

Hosts.—*Estigmen aceraca* (Drury) 5, *Phragmatobia fuliginosa rubricosa* Harris 7, *Isia isabella* (Abbot and Smith) 2, *Diacrisia virginica* (Fabricius) 1. Published records not duplicated above: *Phragmatobia fuliginosa* (Linnaeus) (Tothill), *Arctia* sp. (Coquillett).

Remarks.—The material examined consisted of 15 reared specimens bearing Gypsy Moth Laboratory note numbers. This included the type, allotype, and male paratype, No. 10046 B5; 2 female paratypes, Bangor, Maine, No. 10046 E19; 1 male and 2 female paratypes, Revere, Mass., Nos. 12140 B and B1. It also included 1 male and 4 female collected specimens (Aldrich, Hunter).

Practically all the differences between *Apomyia estigmenensis* and *A. affinis* are relative. Sixteen specimens collected at North Saugus, North Andover, and Melrose, Mass., favor to some extent the *A. affinis* characters. As these specimens apparently were collected at former liberation points of *Porthetria dispar* parasites, the writer offers the suggestion that there is a possibility that the European species might have been accidentally established in this country.

Adults, May to October; generations, two or three; number per host, one or two; hibernation, as larva in host larva.

6. *APLOMYA AFFINIS* (Fallen), new combination

Tachina affinis FALLEN, Svenska Vet.-Akad. Handl., vol. 31, p. 260, 1810; Monographia muscidum Sueciae, pp. 28, 57, 1820.—MEIGEN, Systematische Beschreibung der europäischen zweiflügeligen Insecten, vol. 4, pp. 327, 153, 1824.—ZETTERSTEDT, Diptera Scandinaviae, vol. 3, p. 1106, 1844.

Huebneria affinis (Fallen) ROBINEAU-DESVOIDY, Ann. Soc. Ent. France, 1847, p. 601; Histoire naturelle des diptères des environs de Paris, vol. 1, p. 279, 1863.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, p. 553, 1910.—TOWNSEND, Manual of myiology, pt. 2, p. 60, 1935; pt. 4, pp. 209, 212, 1936.

Exorista polychaeta MACQUART, Ann. Soc. Ent. France, 1849, p. 380.

Exorista affinis (Fallen) MEIGEN, Systematische Beschreibung der europäischen zweiflügeligen Insecten, vol. 7, p. 255, 1838.—BEZZI and STEIN, Katalog der paläarktischen Dipteren, vol. 3, p. 239, 1907.—HOWARD and FISKE, U. S. Dept. Agr., Bur. Ent., Bull. 91, pp. 88-89, 1911.—BAER, Zeitschr. Angew. Ent., vol. 7, p. 147 (113), 1921.—STEIN, Arch. Naturg., Abt. A, Heft. 6, p. 72, 1924.—THOMPSON, Ann. Parasitol., Humaine et Compar., vol. 4, p. 212, figs. 9, 16, 1926.—LUNDBECK, Diptera Danica, pt. 7, p. 313, 1927.—WAINWRIGHT, Trans. Ent. Soc. London, 1928, p. 187.

No attempt is made to separate *Aplomya affinis* from *A. estigmenensis* in the key. This is another example of the resemblance of species between the Nearctic and Palearctic realms. The species *A. estigmenensis*, as represented by the type material, is distinct from *A. affinis* on both adult and puparial characters. There is, however, no proof that *A. affinis* does not occur in North America. Sixteen specimens collected at North Saugus, North Andover, and Melrose, Mass., former liberation points of gypsy moth parasites, favor to some extent the characters of *A. affinis*. The suggestion is offered that the European species might have been accidentally established in this country while gypsy moth parasites were being imported. The other possibility is that more Nearctic material may indicate a greater intergradation of the adult characters. *Arctia caja* (Linnaeus) and *Phragmatobia fuliginosa* (Linnaeus) have been reported as being Holarctic in their distribution. They are of doubtful Nearctic occurrence, as they are represented by varieties that do not occur in the Palearctic realm. The close resemblance of the hosts may have allowed for a closer parallel development of the parasites than in some of the other cases where similar superficial resemblance of the parasites has been noticed.

Male always with three and occasionally with four, female with three and usually additional reclinate prevertical bristles and hairs; frontal bristles consistently more numerous in the males. Fourth vein of wing with an indication of a fold or an appendage, usually with a very small stump, especially in the females. Abdomen as well as thorax more noticeably pollinose than in *Aplomya estigmenensis*; dorsal vitta present on second segment and obscurely indicated on segments 3 and 4, especially in males; usually but not always with four marginal macrochaetae on second segment; usually with several discal macrochaetae and bristles on second and third segments. Otherwise the description is much the same as for *A. estigmenensis*.

Distribution.—Europe, extending northward to southern Sweden and Finland.

Hosts.—The published host list is an extensive one. Baer and Lundbeck list (the first six are also listed by Bezzi and Stein): *Porthetria dispar* (Linnaeus), *Saturnia pavonia* (Linnaeus), *Pachytelia villosella* (Ochsenheimer), *Acrionicta alni* (Linnaeus), *Saturnia pyri* (Schifferrmüller), *Arctia caja* (Linnaeus), *A. hebe* (Linnaeus), *A. villica* (Linnaeus), *Vanessa urticae* (Linnaeus), *Orgyia gonostigma* (Fabricius), *Dasychira pudibunda* (Linnaeus), *Malacosoma neustria* (Linnaeus), *Dendrolimus pini* (Linnaeus), *Phragmatobia fuliginosa* (Linnaeus), *Acrionicta tridens* (Schifferrmüller), *Taeniocampa incerta* (Hufnagel) questionably listed by Baer, *Lymantria monacha* (Lin-

naeus) is questionably listed. Baer lists *Therapis econymaria* (Schiffmüller). The species has been reared by the Bureau's former Central European Laboratory on *A. carya* 11, *A. hebe* 6, and various arctiid species 15.

Remarks.—The material examined consisted of 32 reared and 3 collected specimens from various localities in Hungary.

Ovoviparous species depositing on the skin of the host; egg colorless, without pedicel, 0.71 by 0.24 mm.

With the exception of the prominence at the base of the stigmal plates, the puparia of *Aplomya affinis* are very similar to those of *Carecia cheloniae* Rondani.

Superficially it is very easy, unless reasonable care is taken, to misidentify female specimens of *Carecia cheloniae* as *Aplomya affinis*. It is suggested that perhaps *polychaeta* Macquart, instead of being a variety of *affinis* with four postsutural dorsocentral macrochaetae, is the same species as *cheloniae* Rondani. The writer has found this to be true, as females of *cheloniae* have been found with material determined as *affinis*. If this is true then *Exorista polychaeta* Macquart equals *Exorista cheloniae* Rondani.

7. *APLOMYA SETINERVIS* (Coquillett), new combination

Exorista setinervis Coquillett, Proc. Ent. Soc. Washington, vol. 12, p. 129, 1910.
Zenillia setinervis (Coquillett) Aldrich and Webber, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 26, 1924.

Head with front of male at narrowest 0.23 and in female 0.27 head width; frontal row of eight bristles in male and five in female, extending from on a level with base of third antennal segment to two reclinate preverticals, widely separated, the first stronger than the second; facial ridge bristly on lowest one-third; gena one-sixth eye height; parafrontal and face silvery pollinose; third antennal segment in male more than four and in female four times second; arista thickened on basal one-fifth, penultimate segment short.

Thorax black, gray pollinose, marked with four mesonotal vittae; hind tibia not ciliate; pulvilli ashy color, long in male, short in female.

Abdomen shining black and polished, excepting the narrow bases of second and third segments, which are bluish-white pruinose.

Length 6 mm.

Type locality.—Clarksburg, Tenn.

Distribution.—Tennessee 1, North Carolina 1.

Type.—Male, U.S.N.M. No. 13097.

Host.—Unknown.

Remarks.—Description based on an examination of the collected type male (Morgan) and a collected female, Raleigh, N. C. (Sherman).

8. *APLOMYA CRASSISETA* (Aldrich and Webber), new combination

Zenillia crassisetata ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 29, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.

Head with front of male at narrowest 0.23 to 0.24 and in female 0.28 head width; frontal row of eight or nine bristles in male and five to six in female, extending from slightly below junction of the second and third antennal segments in male and slightly above in female to two strong reclinate preverticals; parafrontal of male varying from golden pollinose to slightly brassy pollinose, in the female grayish pollinose without a conspicuous brassy tinge (allotype female with a brassy tinge); facial ridge bristly on lowest one-sixth; gena one-seventh to one-sixth eye height; face, parafacials, and posterior orbits silver-gray pollinose, face in two males slightly tinged with gold; antenna black, third segment in male about two and one-half and in female twice second; arista thickened on basal one-fourth to one-third, penultimate segment short.

Thorax black, dusted lightly with a gray pollen, sometimes with a yellow tinge; five mesonotal vittae; male type with three post-sutural dorsocentral macrochaetae, the remainder with four; midtibia with two or three median anterolateral bristles; hind tibia unevenly ciliate, with one longer bristle; wing grayish hyaline tinged with brown; third vein with two bristles at base; squamae white.

Abdomen black; in male second and third segments on basal two-thirds and fourth on basal one-half, in female second and third segments on basal one-fifth and fourth on basal one-third densely light-gray-silvery pollinose; remainder, including dorsal vitta on second segment, shining black; first segment with one pair, second with two pairs, third and fourth with a row of marginal macrochaetae; second and third segments with one pair and fourth segment with at least one row of discal macrochaetae, in one female the discals on second and third segments weak; abdominal hairs suberect in male, depressed in female.

Length 7 to 9 mm.

Type locality.—Lafayette, Ind.

Distribution.—Indiana 1, Massachusetts 1, New Jersey 1.

Type.—Male, U.S.N.M. No. 25695.

Host.—Unknown.

Remarks.—Description based on an examination of the type male, August 31, 1917 (Aldrich); allotype female and paratype male, North Andover, Mass., July 11, 1916 (H. E. Smith); and two males and one female, Somerville, N. J., May 22, 1922 (Webber). The front of the last three specimens are less golden-pollinose, but a survey of the

characters including the genitalia shows a very close resemblance to the paratype male.

9. *APLOMYA NEUROTOMAE*, new species

This species resembles to some extent both *Aplomya fronto* Coquillett and *A. caesar* Aldrich.

Male (type).—Head with front at narrowest 0.29 head width; frontal row of bristles extending from on a level with a little below base of third antennal segment to three strong reclinate upper frontals on one side and two strong and one weak on other; no small hairs on upper part of parafacial directly below lowest frontals; facial ridge bristly on lowest two-fifths; gena one-sixth eye height; parafrontal, face, gena, and posterior orbit with light-gray, silvery pollen, parafrontal slightly blackish on upper part toward vertex; antenna black, third segment four and one-half times as long as second.

Thorax shining black covered with gray pollen, marked by five mesonotal vittae; black scutellum covered with gray pollen except on basal one-fourth, with a pair of discal scutellars; hind tibia ciliate, with one long bristle near middle; wing grayish hyaline; third vein with three and four bristles at base; squamae white.

Abdomen shining black, second to fourth segments silvery-gray pollinose except narrow posterior borders and a dorsal vitta, which are shining black; sides of second abdominal segment faintly reddish underneath the pollen; second and third segments with a pair of discal macrochaetae; first and second segments with a pair and third with a row of marginal macrochaetae; fourth segment with a discal row and tipped with marginal bristles.

Length 8 mm.

Female (allotype).—Front at narrowest part 0.30 head width; two reclinate upper frontals; two pairs of fronto-orbital bristles; third segment of antenna slightly less than four times second. Pulvilli one-half length of those of male; third vein of wing with two bristles at base. Dorsal ground color of abdomen black; venter and sides yellow, on second and third segments extending up on dorsum somewhat; pollen pattern as in male.

Length 7 mm.

The paratype material varies as follows: Males with from two to three reclinate preverticals, usually two, females with only two; in one specimen of each sex frontal bristles descending only to junction of second and third antennal segments; facial ridge bristly from one-third to one-half; gena varying from one-eighth to one-sixth, usually one-sixth; arista varying but usually thickened on basal one-third; palpi of three females tipped with yellow. Two males have the scutellum tipped with yellow; one male, three dorsocentrals on one

side; two males, four sternopleurals on one side; third vein with from two to five bristles at base, usually two. Color of male abdomen usually black, two having a reddish spot on sides of second segment, one male colored as in female except that the fourth segment is black; one specimen of each sex lacks discal macrochaetae on the second and third segments, the female having only a widely separated pair of marginals on the third segment; in some specimens only one of the usual pair of discal macrochaetae is present.

Length 6 to 8 mm.

Type locality.—Clinton, N. J.

Distribution.—New Hampshire 1, Massachusetts 2, Connecticut 2, Rhode Island 1, New Jersey 14, Pennsylvania 2.

Type.—Male, U.S.N.M. No. 54148.

Host.—*Neurotoma fasciata* (Norton) 66.

Remarks.—The material examined consisted of 66 reared specimens bearing Gypsy Moth Laboratory note numbers. Included are the type and 2 male and 1 female paratypes No. 11733 N5; allotype, Mason, N. H., 12111 H2; 1 male paratype, Revere, Mass., No. 12111 F1c; 1 male and 2 female paratypes, Somerville, N. J., No. 11733 K1, L1; 1 female paratype, Piscataway, N. J., No. 11733 L2; 1 male paratype, Patterson, N. J., No. 12111 L2; 1 male paratype, Hackettstown, N. J., No. 11733 N3; 1 female paratype, Lebanon, N. J., No. 11733 N4; 1 female paratype, New Milford, Pa., No. 12111 P3; 1 male and 1 female paratypes, Doylestown, Pa., No. 12111 R1.

Three females had yellow palpi. Although the palpi are usually black, especially so in the males, other specimens of both sexes show gradations between yellow and black. The female palpi are lighter in color than in the male, sometimes with the tip yellow. When the palpi are yellow the bases are strongly infuscated.

Adults, May to September; generations, one or two.

10. *APLOMYA CONFUSIONIS*, new species

Exorista nigripalpis TOWNSEND (nec Macquart, 1846), Psyche, vol. 7, p. 330, 1896.

Exorista nigripalpis AINSLIE (nec Townsend), Journ. Agr. Res., vol. 24, p. 411, 1923; U. S. Dept. Agr. Tech. Bull. 31, p. 14, 1927.

Zenillia caesar (Aldrich) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 28, 1924.

It is possible that instead of *Exorista caesar* Aldrich this species may be the same as *E. nigripalpis* Townsend. In any case *nigripalpis* is preoccupied by *Exorista nigripalpis* Macquart, 1846.

Male (type).—Head with front at narrowest 0.26 head width; frontal row of eight bristles, extending from on a level with base of third antennal segment to two reclinate preverticals; facial ridge bristly on lowest one-fourth; gena about one-sixth eye height; parafrontal, face, and gena silvery pollinose, parafrontal slightly blackish on upper part

toward vertex; antenna black, third segment three and one-half times as long as second.

Thorax shining black, thinly gray pollinose, marked by five mesonotal vittae; black scutellum with a pair of weak discal scutellars; midtibia with three median anterolateral bristles; hind tibia unevenly ciliate; third vein with two bristles at base.

Abdomen, including dorsal vitta, shining black all except a very narrow basal border on segments 2, 3, and 4, which are grayish pollinose; pollen confined more to base and sides of segments (fourth segment appearing to be almost without pollen in some specimens); first and second segments with a pair, and third with a row, of marginal macrochaetae; fourth segment with marginal and submarginal bristles.

Female (allotype).—Front at narrowest 0.28 head width; seven frontal bristles, three reclinate preverticals; gena one-eighth eye height; third segment of antenna twice as long as second. Midtibia with two median anterolateral bristles; pulvilli one-half length of male pulvilli.

The paratype material varies as follows: Front in male 0.26 to 0.27, in female 0.28 to 0.30, head width; male with from seven to nine frontal bristles, female usually with seven, usually two reclinate preverticals; facial ridge bristly on lowest one-fifth to one-fourth; gena usually one-eighth eye height, some female palpi brownish. One female with four sternopleural macrochaetae on one side; discal scutellars usually present, two males lacking them; mid tibia usually with two median anterolateral bristles.

Type and allotype locality.—Franconia, N. H.

Distribution.—New Hampshire 3, Massachusetts 3, Colorado 1, District of Columbia 1, Indiana 1, Idaho 1, Wyoming 1, Nevada 1, Washington 1.

Type.—Male, U.S.N.M. No. 54142.

Host.—*Crambus trisectus* (Walker) 5. Published record: *Crambus mutabilis* Clemens (Ainslie).

Remarks.—The material examined consisted of the type and one male paratype collected July 30, 1915 (Townsend); the allotype and four male paratypes, July 31, 1915 (Townsend); two male paratypes, Fabyans, N. H., August 19, 1914 (Townsend); two female paratypes, Mt. Holyoke Gap, Mass., September 18, 22, 1914 (Townsend); one female paratype, Washington, D. C., May 19, 1927; one female paratype, Tennessee Pass, Colo., July 11, 10,240 ft. (Aldrich); one female paratype, Lafayette, Ind., August 24, 1920. Exp. 20238 (Blum); one female paratype ex *Crambus trisectus* (Walker), Lafayette, Ind., Knoxville No. 2040 (Larrimer); four males ex *C. trisectus* (Larrimer); one male and one female, June 21, 1888, No. 3679^o; one male and three females collected in various places by Townsend, Aldrich, Morrison.

Webber, Allen, and Baker. One male collected at Potlatch, Idaho, July 27, 1927 (Aldrich), may possibly be distinct from this species. This male has all pollen tinged with gold, the abdomen excepted, the body hairs of thorax and abdomen much longer, and the frons not much deeper golden than the type and other specimens.

11. *APLOMYA CAESAR* (Aldrich), new combination

Exorista nigripalpis TOWNSEND (nec Macquart, 1846), *Psyche*, vol. 7, p. 330, 1896.—COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 93, 1897.—TOTHILL, Can. Ent., vol. 45, p. 71, 1913; *Ottawa Nat.*, vol. 28, p. 114, 1914.—GIBSON, Ann. Rep. Ontario Ent. Soc., 1918, p. 117.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, p. 11, fig. 83 (puparium), 1922.—HUFER and NEISWANDER, Journ. Econ. Ent., vol 17, p. 127, 1924.

Exorista caesar ALDRICH, Can. Ent., vol. 48, p. 20, 1916.—CAESAR, Ann. Rep. Ontario Ent. Soc. 1916, p. 173.—SPENCER and CRAWFORD, Ontario Dept. Agr. Bull. 295, p. 7, 1923.

Zenillia caesar (Aldrich) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 28-29, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925; Biological survey of Mount Desert, The insect fauna, pt. 1, p. 201, 1927.—ESSIG, Insects of Western North America, p. 581, 1926.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.

This species has been considered to be synonymous with *Aplomya mitis* Meigen, an introduced parasite of the European corn borer. This is another example of the resemblance of species between the Nearctic and Palearctic realms. The characters used to separate these two species are more or less relative in value, but, if carefully used, they will be found to be satisfactory.

Frontal row of eight to ten bristles in male and six to eight in female, extending from on a level with base of third antennal segment to one reclinate prevertical; facial ridge bristly on lowest one-fourth in male, lowest one-sixth in female; gena one-sixth eye height; antenna black; palpus black.

Thorax black, thinly gray-pollinose in male, more noticeably pollinose in female, with a bluish tinge; marked with five mesonotal vittae, the three median vittae very prominent before the suture and abbreviated behind; disk of scutellum covered with erect hairs, usual pair of discal scutellars lacking; hind tibia not ciliate; wing grayish hyaline, third vein with two bristles at base; squamae white.

Abdomen black, gray-pollinose (more noticeably so in female) with a bluish tinge; second to fourth segments pollinose on basal two-thirds, varying from thinly gray pollinose to a heavier silver-gray pollinose laterally and basally; first segment, posterior one-third of segments two to four, and dorsal vitta shining black; abdominal hairs suberect in male, depressed in female; first and second segments with a pair and third with a row of marginal macrochaetae; fourth segment rather irregularly tipped with marginal and sub-

marginal bristles that almost approach the macrochaetae in size, in the female the marginal bristles not at all developed.

Length 5 to 7 mm.

Type locality.—Simcoe, Ontario.

Distribution.—New Hampshire 1, Massachusetts 11, Connecticut 2, New York 4, Michigan 3, Indiana 1, Illinois 1, Montana 1, Idaho 4, Washington 1, Colorado 3, Arizona 1, New Mexico 2, Quebec 3, Ontario 1. Published and unpublished records not duplicated above: New York 9 (West) 1 (Aldrich), Ohio 1 (Huber and Neiswander), Alberta 1 (Gibson). Coquillett lists New Hampshire 1, District of Columbia, California 1, and Ontario 1.

Type.—Male, Canadian National Museum. Paratypes (of *caesar*), U.S.N.M. No. 25694. The type of *nigripalpis* is in the University of Kansas.

Hosts.—*Archips argyrospila* (Walker) 20, *Archips fumiferana* (Clemens) 4, *Archips semiferrana* (Walker) 3, *Archips purpurana* (Clemens) 1, *Archips parallela* (Robinson) 1, *Nygmia phaeorrhoea* (Donovan) 1, *Pyrausta nubilalis* (Hübner) 17, *P. penitalis* (Grote) 9, *P. ainsliei* (Heinrich) 2, *Lorostege commixtalis* (Walker) 2, *Lorostege sticticalis* (Linnaeus) 1, *Papaipema nitela* (Guénée) 1. Published records not duplicated above: *P. nubilalis* (Huber and Neiswander).

Remarks.—The foregoing description is based on an examination of the following material: 2 male paratypes, 1 female paratype, and 1 male reared from *Archips argyrospila*, Simcoe, Ontario (Caesar); 7 males and 5 females reared from *A. argyrospila*, Canyon City, Colo. (Gill); 1 female ex *A. argyrospila*, Darby, Mont. (Regan); 1 female ex *A. argyrospila*, Wenatchee, Wash. (Newcomer); 12 specimens bearing Gypsy Moth Laboratory note numbers; 1 male ex *Lorostege sticticalis*, Greeley, Colo. (Mallory); 1 male and 1 female ex *L. commixtalis*, Fort Collins, Colo.; 9 males and 8 females ex *Pyrausta nubilalis* (Corn Borer Laboratory); 5 males and 4 females ex *P. penitalis* (Corn Borer Laboratory); 1 male and 1 female ex *P. ainsliei* (Corn Borer Laboratory); 7 males and 9 females, collected specimens (Aldrich, Townsend, Piper, Walton, and Mosher).

One male collected on Harvey Ranch, altitude 10,000 feet, Pecos National Forest, August 16 (Townsend). A much darker species with a bluish cast, the frons bluish black. It is probably a distinct species.

The material reared from *Pyrausta* as characterized by the tawny or brassy tinge to the parafrontals seems to be slightly different from the material reared from *Archips*. On most of the characters, however, they appear to be very much alike. The description is based mostly on the material secured from the various species of *Archips*.

Adults, June to September; generations, probably two; hibernation, as larva in most larva.

12. *APLOMYA MITIS* (Meigen), new combination

Tachina mitis MEIGEN, Systematische Beschreibung der europäischen zweiflügeligen Insecten, vol. 4, p. 335, 165, 1824; vol. 7, p. 256, 16, 1838.

Parerorista mitis (Meigen) BRAUER and BERGENSTAMM, Denkschr. Akad. Wiss. Wien, math.-nat. Kl., vol. 58, pp. 319, 325, 1891.

Erorista mitis (Meigen) SCHNER, Fauna Austriaca, Die Fliegen, vol. 1, p. 467, 1862.—BEZZI and STEIN, Katalog der paläarktischen Dipteren, vol. 3, p. 244, 1907.—BAER, Zeitschr. Angew. Ent., vol. 7, p. 147 (113), 1921.—STEIN, Arch. Naturg., Abt. A, Heft 6, pp. 68, 78, 1924.—LUNDBECK, Diptera Danica, pt. 7, p. 320, 1927.

This species has been introduced into the United States in small numbers as a parasite of the European corn borer. As *Aplomya caesar* (Aldrich) has been considered to be a synonym of *A. mitis* (Meigen), it has previously been impossible to state definitely whether *A. mitis* has actually been established in this country. All the known differences between *A. caesar* and *A. mitis* are cited in the key to the species.

Distribution.—Widely distributed in Europe from France to northern Sweden. The species is not common.

Hosts.—*Pyrausta nubilalis* (Hübner) 12. Published record: *Calyptomyia trapezina* (Linnaeus) (Bezzi and Stein, Baer).

Remarks.—The differences cited are based on an examination of three males and two females from Paris, France (Parker), furnished by the European Corn Borer Laboratory, Toledo, Ohio; and four males and three females from Lille, France (Thompson), bearing numbers IN. 1.24–2.12, ser. 271, Webster no. 18818, reared from bulk collections of European corn borer.

On the basis of the small amount of material examined, the writer is unable to state whether *Aplomya mitis* is established in the United States. The material examined that was reared in the United States from *Pyrausta nubilalis*, *P. penitalis*, and *P. ainsliei* was all referred to *Aplomya caesar* (Aldrich).

Commencing in 1928, *Aplomya mitis* has been liberated in small numbers in 19 localities in the following States: Massachusetts 5, Connecticut 1, Rhode Island 2, New York 4, Pennsylvania 1, Ohio 3, Indiana 1, and Michigan 2. Information supplied by the European Corn Borer Laboratory, Toledo, Ohio.

13. *APLOMYA POLITA* (Coquillett), new combination

Erorista polita COQUILLETT, U. S. Dept. Agr. Div. Ent., Tech. Bull. 7, p. 99, 1897.

Zenillia polita (Coquillett) ALDRICH and WEBBER, U. S. Nat. Mus., vol. 63, art. 17, p. 25, 1924.

Head with front at narrowest 0.26 head width; frontal row of bristles extending from on a level below base of third antennal segment to three reclinate preverticals; facial ridge bristly on lowest one-fourth; gena one-eighth eye height; face silvery pruinose; third

segment of antenna five times length of second; arista hardly thickened on basal one-fourth, penultimate segment short.

Thorax marked with four mesonotal vittae; scutellum black; hind tibia ciliate.

Abdomen shining black, narrow bases of segments 2 and 3 white-pollinose, abdominal hairs rather long and suberect.

Length 7 mm.

Type locality.—Tifton, Ga.

Type.—Male, U.S.N.M. No. 3598.

Host.—Unknown.

Remarks.—Redescribed from type specimen.

14. *APLOMYA HELVINA* (Coquillett), new combination

Exorista helvina COQUILLETT, U. S. Dept. Agr., Div. Ent. Tech. Bull. 7, p. 96, 1897.—SLOSSON, Ent. News, vol. 9, p. 252, 1898.—SMITH, Catalogue of New Jersey insects, p. 672, 1899; p. 780, 1909.—TOTHILL, Can. Ent. vol. 45, p. 71, 1913.

Zenillia helvina (Coquillett) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 15-16, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925; Biological survey of the Mount Desert region, The insect fauna, pt. 1, p. 201, 1927.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 112, 1934.—PROCTER, Biological survey of the Mount Desert region, The insect fauna, pt. 6, p. 374, 1938.

Huebneria helvina (Coquillett) TOWNSEND, Manual of myiology, pt. 4, p. 212, 1936.

Head with front of male at narrowest 0.27 to 0.29 and in female 0.30 to 0.33 head width; frontal row of six to eight bristles, extending from on a level with base of third antennal segment to two reclinate preverticals; facial ridge bristly on lowest one-fifth; gena one-sixth to one-fifth eye height; face and gena light-gray-silver pollinose; antenna with third segment black, first and second segments varying from rufous to black but usually rufous, third segment in male four and one-half and in female three and one-half times the second; arista thickened on basal one-fourth, penultimate segment short.

Thorax black, dorsum densely covered with golden pollen, sides and venter gray pollinose; five mesonotal vittae; scutellum black covered with dense golden pollen; mid tibia with one or two, usually two, median anterolateral bristles, one long bristle in middle and a shorter one above it which was consistently longer in female than in male; hind tibia unevenly ciliate; third vein with three or four bristles at base; squamae white.

Abdomen black, dorsum entirely covered with dense golden pollen, venter silvery pollinose, sometimes with a slight brassy tinge; first and second segments with a pair and third with a row of marginal macrochaetae; fourth segment tipped with marginal and submarginal bristles more or less irregularly placed.

Length 6 to 9 mm.

Type locality.—White Mountains, N. H.

Distribution.—Maine 13, New Hampshire 3, Massachusetts 3, New York 3, New Jersey 1, Pennsylvania 1, Washington 1. Published records not duplicated above: Maine (Johnson, Procter), New York 5 (West), New Jersey 4 (Smith), Connecticut (Schaffner and Griswold), British Columbia (Tothill).

Type.—Male, U.S.N.M. No. 3624.

Hosts.—*Lycia cognataria* (Guénée) 52. Published records not duplicated above: *Lycia cognataria* (Tothill, Johnson), *Nacophora quernaria* (Albot and Smith) (Schaffner and Griswold), unidentified Geometridae (Schaffner and Griswold).

Remarks.—The foregoing description was based on an examination of the following material: type male with discals on the third segment (Morrison); 52 reared specimens bearing Gypsy Moth Laboratory note numbers; five males and five females collected in various places by Slosson, Townsend, Aldrich, and Walton (all but one of the collected specimens had discals on the third abdominal segment).

Adults, June to August; generations, one; number per host, one; hibernation, in the puparium. There was a macrotype egg jutting from the ovipositor of one of the collected females.

15. *APLOMYA EPICYDES* (Walker), new combination

Tachina epicydes WALKER, List of the specimens of dipterous insects in the collection of the British Museum, pt. 4, p. 786, 1849.

Exorista affinis (Fallen) COQUILLETT (partim), U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 94, 1897.

Exorista epicydes (Walker) AUSTEN, Ann. Mag. Nat. Hist., ser. 7, vol. 19, p. 336, 1907.

Zenillia coerulea ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 23, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925.

Zenillia epicydes (Walker) ALDRICH, Proc. U. S. Nat. Mus., vol. 80, art. 10, p. 10, 1931.

Head with front in male at narrowest 0.17 to 0.19 and in female 0.26 to 0.28 of head width; frontal row of 10 to 13 bristles in male and 7 to 11 in female extending from on a level with base of third antennal segment to two reclinate preverticals; facial ridge bristly on lowest one-fourth; genae about one-seventh eye height; parafrontal, face, and gena silvery pollinose with a blackish tinge; third segment of antenna from one and three-fourths to twice second; arista thickened on basal one-third, penultimate segment short.

Thorax black covered with gray pollen with a slight bluish tinge, five black mesonotal vittae; scutellum varying from yellow to black, densely covered with silvery-gray pollen; legs black; midtibia with two median anterolateral bristles in male and three in female; hind tibia unevenly ciliate; wing hyaline, bend of last section of

fourth vein a little rounded, hind cross vein curved, third vein usually with two bristles at base; squamae white.

Abdomen black, gray-pollinose, dorsum of first segment, narrow apical margins of second and third, tip of fourth, and dorsal vitta shining black; gray pollen interrupted by irregular black areas that shift when viewed in different lights; discal portions of second and third segments bearing erect bristles that at times approach macrochaetae in size, often some of larger ones more or less regularly placed, giving appearance of discal macrochaetae; first segment with one pair, second with two pairs, and third with a marginal row of macrochaetae; fourth segment covered with erect bristles about one-half size of macrochaetae on third segment.

Length 9 to 12 mm.

Type locality.—Martin Falls, Albany River, Canada.

Distribution.—Maine 2, New Hampshire 1, Vermont 1, Massachusetts 4, Rhode Island 1.

Type.—Male, British Museum.

Host.—*Cimbea americana* Leach 14.

Remarks.—The foregoing description was based on an examination of 14 reared specimens bearing Gypsy Moth Laboratory note numbers including female type and female paratype (No. 10039 E10) of *Zenillia coerulea* Aldrich and Webber, U.S.N.M. No. 2574.

Adults, June and July; generations, one; number per host, one to four; hibernation, in puparium.

16. *APLOMYA IMITATOR*, new species

Male (type).—Frontal row of 13 bristles, extending from on a level with base of third antennal segment to 1 reclinate prevertical; facial ridge bristly on the lowest one-fourth; gena one-fifth eye height; parafrontal smoky-gray pollinose; third segment of antenna one and three-fourths times second (wider than in *epicydes*); arista thickened on basal one-fifth, penultimate segment short.

Thorax black, gray-pollinose; scutellum black; midtibia with three median anterolateral bristles; hind tibia not ciliate; third vein of wing with one bristle at base; squamae white.

Abdomen black, gray-pollinose; first segment shining black; discal bristles on second and third segments, some approaching size of macrochaetae; first segment with a pair, second with two pairs, and third with a row of marginal macrochaetae; fourth segment irregularly bristly.

Type locality.—Lillooet, British Columbia.

Type.—Male, U.S.N.M. No. 54144.

Remarks.—Description based on type male collected May 7, 1918, by A. B. Baird.

17. *APLOMYA TRICHIOSOMAE*, new species

Male (type).—Frontal row of 10 bristles, extending from on a level with base of third antennal segment to 2 reclinate preverticals; facial ridge bristly on the lowest one-fourth; gena one-eighth eye height; parafrontal, face, and gena silvery black (much blacker than in *epicydes*); third segment of antenna little more than twice second (wider than in *epicydes*), third segment having a swollen appearance when viewed from above; arista thickened on basal one-third, penultimate segment short.

Thorax black, subshining, very lightly covered with gray pollen; five black mesonotal vittae; scutellum shining black, so lightly covered with gray pollen that the black is hardly noticeable; legs black; midtibia with two long, median, anterolateral bristles on one side and three on other; hind tibia unevenly ciliate; wing hyaline, bend of last section of fourth vein forming an obtuse angle, hind cross vein straight, third vein with two bristles at base; squamae white.

Abdomen shining black, silver-gray pollen confined to a narrow basal border dorsally on second, third, and fourth segments, broadening out to cover greater part of sides and venter of segments; discal portions of second and third segments bearing erect bristles; first segment with a pair, second with two pairs, and third with a marginal row of macrochaetae; fourth segment covered with erect bristles about one-half size of macrochaetae on third segment.

Length 8.5 mm.

Type locality.—Greenville, Maine.

Type.—Male, U.S.N.M. No. 54145.

Host.—*Trichiosoma* sp.

Remarks.—Described from one male bearing Gypsy Moth Laboratory note number 10088 N11 recovered June 4, 1928, from three larvae collected September 14, 1927.

18. *APLOMYA CERURAE*, new species

Zenillia n. sp. (3) SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 113, 1934.

Male (type).—Head with front at the narrowest 0.24 head width; frontal vitta brown, slightly less than one-third width of front; frontal row of nine bristles, extending from base of third antennal joint to two reclinate preverticals; parafrontal blackish gray-pollinose, black more predominant toward vertex; facial ridge bristly on lowest one-third; face silvery and gena gray-pollinose; antenna black, third segment six times length of second; arista thickened on basal two-fifths, penultimate segment short.

Thorax black, with a very slight bluish tinge, covered with grayish pollen; five black mesonotal vittae; midtibia with one long median

anterolateral bristle; hind tibia ciliate, with one longer bristle; wing grayish hyaline; third vein with two bristles at base; squamae white.

Abdomen shining black, light-gray pollinose except posterior borders and dorsal vitta, which are shining black; discal portions of second, third, and fourth segments covered with irregularly placed, erect bristles that approach the macrochaetae in size; first and second segments with one pair and third and fourth with a row of marginal macrochaetae.

Length 8 mm.

One male paratype differs from the type in having one smaller bristle above one long, median, anterolateral bristle; only two sternopleural macrochaetae on one side.

Length 8 mm.

Type locality.—Melrose, Mass.

Type.—Male, U.S.N.M. No. 54146.

Host.—*Cerura cinerea* Walker 2.

Remarks.—The material examined consisted of type and one paratype male bearing Gypsy Moth Laboratory note number 12164 P 119. Adults issued June 5 and 10, 1929, secured from one larva collected August 20, 1928. An additional three puparia from the same larva failed to produce adults.

19. *APLOMYA PHEOSIAE*, new species

Zenillia n. sp. (5) SCHIAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 114, 1934.

Male (type).—Head at narrowest 0.20 head width; frontal vitta brown, one-third width of front; frontal row of 11 bristles, extending from on a level with base of third antennal segment to one reclinate prevertical; facial ridge bristly on lowest two-fifths; gena one-fifth eye height, gray-pollinose; parafrontal and parafacial brassy, facial depression and posterior orbit silvery pollinose; antenna black, third segment four times as long as second; arista thickened on basal one-fourth, penultimate segment short.

Thorax shining black, lightly covered with gray pollen; five black mesonotal vittae; scutellum black covered with gray pollen; midtibia with one long median anterolateral bristle; wing grayish hyaline, third vein with one bristle at the base; squamae white.

Abdomen shining black, second to fourth segments light-gray-pollinose except posterior margin and a dorsal vitta, which are shining black; second and third segments with a few erect bristles and discal macrochaetae a little irregularly placed; first and second segments with a pair and third with a row of marginal macrochaetae; fourth segment irregularly tipped with marginal and submarginal macrochaetae.

Length 8 mm.

Female (allotype).—Front at narrowest 0.30 head width; two reclinate preverticals; two pairs of fronto-orbital bristles; facial ridge bristly on lowest one-third. Midtibia with one long, median, anterolateral bristle and one short one above it; pulvilli one-half length of those of male.

Length 7 mm.

The paratype material varies from the type description as follows: Reclinate preverticals varying from one to two; gena from one-sixth to one-fifth eye height. Scutellum usually black but three males with tip yellow; only one male and all but two females having one long, median, anterolateral bristle with a shorter one above it; third vein with either one or two bristles at base.

Length 6 to 9 mm.

Type and allotype localities.—Moose River Plantation, Maine.

Distribution.—Maine 5, Massachusetts 1. Recorded but not duplicated above: Maine 9, Massachusetts 1.

Type.—Male, U.S.N.M. No. 54147.

Host.—*Phcosia dimidiata* (Herrich-Schaeffer) 18; *Allypia octomaculata* (Fabricius) 1.

Remarks.—The material examined consisted of 19 reared specimens bearing Gypsy Moth Laboratory note numbers. This included the type, the allotype, and 3 male and 1 female paratype, No. 12198 M1; 1 male paratype, Alton, Maine, No. 12198 J3a; 1 male and 3 female paratypes, Sandy Bay Plantation, Maine, No. 12198 N4; 2 male paratypes, West Forks, Maine, No. 12198 N8; 2 female paratypes, Lily Bay, Maine, No. 12198 N16.

Adults, June and July; generations, one; number per host, one to eight; hibernation, in the puparium.

20. *APLOMYA FRONTO* (Coquillett), new combination

Erorista fronto COQUILLET, U. S. Dept. Agr., Div. Ent., Bull. 7, p. 96, 1897.

Zenillia fronto (Coquillett) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 36, 1924.—JOHNSON, List of New England Diptera, 1925.

Head with front in male and female about same, 0.32 head width; row of seven or eight frontal bristles, extending from on a level with a little below base of third antennal segment to two reclinate preverticals; facial ridge bristly on the lowest two-fifths to one-half; gena one-sixth eye height; parafrontal, face, and gena silvery-gray pollinose; antenna black, third segment of male five and three-fourths and of female four and one-fourth times the second; arista thickened on basal one-third, penultimate segment short; palpus completely yellow.

Thorax black, gray-pollinose; marked by five mesonotal vittae; type male lacking a pair of discal scutellar bristles; femora and

tibiae reddish in male, yellowish in female; hind tibia ciliate; pulvilli longer in male; wing grayish hyaline with a brownish tinge, third vein with two to three bristles at base.

Abdomen black, gray-pollinose; side of segments 1 and 2 in male reddish; venter and sides of female abdomen yellow, dorsum of first segment partly yellow; segments 2 to 4 with silvery-gray pollen confined principally to bases of segments; second and third segments with a pair of discal macrochaetae; first and second segments with a pair and third with a row of marginal macrochaetae; fourth segment with a discal row and tipped with marginal bristles.

Length 7 to 8 mm.

Type locality.—Mount Washington, N. H.

Distribution.—New Hampshire 1, Idaho 2, Wyoming 1.

Type.—Male, U.S.N.M. No. 3753.

Host.—Unknown.

Remarks.—The material examined consisted of the type male (Mrs. Slosson) and three females collected by Aldrich.

5. Genus SISYROPA Brauer and Bergenstamm

Sisyropa BRAUER and BERGENSTAMM. Denkschr. Akad. Wiss. Wien, math.-nat. Kl., vol. 56, p. 163, 1889; vol. 58, p. 344, 1891.—COQUILLETT, Proc. U. S. Nat. Mus., vol. 37, p. 606, 1910.—TOWNSEND, Manual of myiology, pt. 4, pp. 207, 209, 211, 1936. (Genotype,¹⁵ *Tachina thermophila* Wiedemann. Monotypic example; Brauer and Bergenstamm, 1889.)

Exorista of COQUILLETT (nec Meigen) partim, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 100, 1897.

Oexorista TOWNSEND, Proc. Ent. Soc. Washington, vol. 14, p. 165, 1912; Proc. Biol. Soc. Washington, vol. 28, p. 21, 1915; Manual of myiology, pt. 4, pp. 206, 207, 210, 211, 1936. (Genotype, *Exorista eudryae* Townsend. By original designation.) (New synonymy.)

Zenillia of ALDRICH and WEBBER (nec Robineau-Desvoidy) partim, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 7, 1924.

Brauer and Bergenstamm in their synopsis in 1889 cited *Tachina thermophila* as the monotypic example of the genus *Sisyropa*, which makes it the genotype. Brauer and Bergenstamm did not recognize the genus *Carcelia*, and their species in 1891 were divided mostly between the genera *Sisyropa* and *Parexorista*. As defined by this paper, species of *Aplomya* and *Zenillia* were also included in their genus *Sisyropa*.

Owing principally to the fact that the pertinent diagnostic characters were not selected, the status of *Sisyropa* has been a perplexing question for many years. The European authorities gradually accepted it as being synonymous with *Carcelia*. Townsend made an attempt to apply its use to the North American fauna in his *Sisyropa*

¹⁵ The writer had the privilege of examining the *Sisyropa* genotype, *thermophila* (Wiedemann), which is in the Natural History Museum, Vienna, Austria.

hemerocampae, which was placed in synonymy with *Carecia amplea*. In 1912 Townsend proposed his genus *Oæxorista*,¹⁶ which must now be placed in synonymy with *Sisyropa*. Townsend places both *Sisyropa* and *Oæxorista* in the tribe Carceliini.

The main diagnostic characters of the genus *Sisyropa* are as follows: Scutellum with four pairs of marginal scutellars and one strong apical pair; hind tibia strongly ciliate on the anterodorsal side, in both sexes, with regular, long, comblike, curved bristles, among which one sometimes stands out larger; third abdominal segment of male with a dense patch of hairs underneath on each side. These characters will readily separate *Sisyropa* from *Aplomya*. As the front at the vertex or narrowest part is 30 per cent or less of the head width and the predominant sexual characteristics (front narrower, and claws and pulvilli elongated in the male) are retained, *Sisyropa* can be readily separated from *Phryce*, *Thelymyia*, and *Chrysophryæ*. As the gena is one-sixth to one-seventh the eye height, *Carecia* is readily excluded. The shape of the abdomen, which is *Carecia*-like, should not be confused with that of *Zenillia*. The Nearctic species of *Sisyropa* lack bristly hairs behind on the apex of the hind coxa.

Using the main characters as cited, only the following two species of those indicated as belonging in Brauer and Bergenstamm's genus in 1891 can be retained: *Sisyropa thermophila* (Wiedemann), genotype, Oriental Realm; *Sisyropa lota* (Meigen), Palearctic Realm. *S. lota* was referred to *Exorista* of authors by Baer, Stein and Lundbeck.

If the pilosity of the eyes is disregarded, the biological relationship of *Sisyropa* to the genus *Sturmia* is evident. Townsend refers *Sisyropa* to the tribe Carceliini and *Sturmia* to Sturmiini, which he considers to be close to Carceliini.

Townsend considers *Exorista lobeliae* Coquillett to be a *Sisyropa*. Neither *E. lobeliae* nor *Zenillia valens* Aldrich and Webber, which is similar to *lobeliae* in many respects, possesses the characteristics ascribed to *Sisyropa*. These two species are not treated in this revision; instead, they are referred to the *Phorocera* complex of Aldrich and Webber.

¹⁶ In 1915, convinced that the specimens T D 395 and T D 425 (upon which *Oæxorista* was founded) were distinct from *eudryae*, Townsend proposed the name *thompsoni* for them. He states that the Dayton, Ohio, female in the U. S. National Museum reared by Jewett (determined by Coquillett as *eudryae*) was designated for him by Coquillett as the holotype of *thompsoni*. As an examination of this specimen proves it to be *eudryae* Townsend, the synonymy is established. It is difficult to see how the designation by Townsend in his Manual, "The true holotype of the genotype is labelled T D 395 and the paratype T D 425" can be accepted. It is unfortunate that the specimen T D 395 was not originally designated as the holotype. The specimen T D 395 was found in the United States National Museum as a paratype of *Zenillia formosa* Aldrich and Webber and is now referred to *Carecia*.

KEY TO THE SPECIES OF SISYROPA

1. Except for the reclinate prevertical bristle, the male usually with 1 and female usually with 2 reclinate upper frontal bristles, 7 to 9 frontal bristles; frontal orbit, face and cheek, and posterior orbit light-silvery-gray pollinose, parafrontal with a slight brassy tinge; antenna black, third segment about three times as long as the second, slightly rufous at junction of second and third segments, second segment slightly rufescent in female; palpus yellow; median dorsal vitta of abdomen shining black, uninterrupted on the second and third segments; midtibia bearing 3 median bristles on anterolateral side, upper bristle nearly as strong as middle, lower bristle much smaller; size 6 to 8 mm.; a lighter appearing species----- 1. *eudryae* (Townsend) (p. 99)

Except for the reclinate prevertical bristle, the male and female with no reclinate upper frontal bristles, male with 10 or 11 and female with 7 to 9 frontal bristles; frontal orbit blackish-gray pollinose, the black gradually becoming more predominant toward vertex, cheek dark-gray pollinose, face and posterior orbit silvery pollinose with a smoky tinge; antenna black, third segment about $2\frac{1}{2}$ times as long as second; palpus yellow, slightly infuscated at base; median dorsal vitta of abdomen shining black on second segment, becoming indistinct on basal half of third segment; mid tibia bearing three or more strong median bristles on anterolateral side, and when with three, upper bristle nearly as strong as middle, lower bristle usually not much smaller than upper; when with more than 3 bristles, especially in some of the larger females, additional bristles usually situated between normal 3 as described above; size 8 to 11 mm.; bristly appearance of this species accentuated by head, thorax, and abdomen appearing more densely covered with longer, finer hairs; a blacker appearing species----- 2. *alypiae*, new species (p. 101)

1. SISYROPA EUDRYAE (Townsend)

Erorista eudryae TOWNSEND, Trans. Amer. Ent. Soc., vol. 19, p. 287, 1892; Psyche, vol. 7, pp. 329-331, 1896.—COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 100, 1897.—SMITH, Catalogue of New Jersey insects, p. 780, 1909.—TOTHILL, Can. Ent., vol. 45, p. 70, 1913; Ottawa Nat., vol. 28, No. 9, p. 114, 1914.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art 10, p. 17, fig. 27 (puparium), 1922.

Oreorista eudryae (Townsend) TOWNSEND, Proc. Ent. Soc. Washington, vol. 14, p. 165, 1912.

Erorista eudryae of THOMPSON (nec Townsend) TOWNSEND, Ann. Ent. Soc. Amer., vol. 8, p. 89, 1915.

Oreorista thompsoni TOWNSEND (partim), Proc. Biol. Soc. Washington, vol. 28, p. 21, 1915.

Zenillia eudryae (Townsend) ALDRICH and WEBBER, Proc. U. S. Natl. Mus., vol. 63, art. 17, pp. 21-22, 1924.—JOHNSON, List of New England Diptera, p. 196, 1925; Biological survey of Mount Desert region, The insect fauna, pt. 1, p. 201, 1927.—WEST, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 814, 1928.—ALDRICH, Proc. U. S. Natl. Mus., vol. 80, art. 20, p. 3, 1932.—SCHAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 112, 1934.

Sisyropa eudryae (Townsend), TOWNSEND, Manual of myiology, pt. 4, pp. 207, 209, 1936.

Aldrich and Webber have discussed the synonymy of *eudryae* and *thompsoni*. I have further compared *thompsoni* with *eudryae*. The

type specimen *thompsoni* (female) is a poor one. It has two reclinate upper frontal bristles besides the prevertical one; the second segment of the antenna is rufescent; the midtibial bristles are not typical of either form but nearer *eudryae*; it has three of these, with one between the lower and middle bristles; apparently it has an interrupted dorsal vitta on the abdomen. As *eudryae* females quite often have two reclinate upper frontals besides the prevertical bristle (maximum discrepancy from *dypiae* females) and the second joint of the antenna is rufescent, the above synonymy is confirmed.

Head with front of male at the narrowest 0.24, 0.25, and 0.26 (in three specimens) and front of female about 0.30 of the head width, frontalia about one-third width of front, brown; frontal bristles exclusive of reclinate frontals seven to nine in number (often six in the female), extending down to base of third antennal joint; female with two proclinate fronto-orbital bristles; facial ridge bristly on lowest third, gena about one-seventh eye height; arista brownish black, thickened basally, penultimate joint short; palpus yellow, somewhat thickened and curved at tip.

Thorax black with a bluish tinge and lightly covered with grayish pollen; five narrow black mesonotal vittae; four postsutural dorso-central macrochaetae; scutellum bluish gray pollinose, yellow at tip, four pairs of marginal scutellars (one of the marginal pairs usually weaker) and one decussate apical pair, one pair of discal scutellars; three sternopleural macrochaetae; front tibia with two bristles on median posterolateral side; hind tibia ciliate comblike, usually with one longer bristle; wing grayish hyaline, third vein with two bristles at base; squamae silvery white.

Abdomen shining black, second to fourth segments light-gray pollinose with more or less of a bluish tinge except posterior borders and a median dorsal vitta, which are shining black; males usually with second and third segments faintly reddish on sides; first and second segments each with one pair of marginal macrochaetae, the third a marginal row, and the fourth irregularly tipped with marginal and submarginal bristles; third abdominal segment of male with a dense patch of hairs underneath on each side.

Length 6 to 8 mm.

Type locality.—Ithaca, N. Y.

Distribution.—New Hampshire 1, Vermont 1, Massachusetts 4, New York 2, Pennsylvania 1, New Jersey 1, Maryland 1, Virginia 1, North Carolina 1, Ohio 1, Ontario. Additional published and unpublished records not duplicated above: Maine (Johnson), Connecticut (Ely, Aldrich and Webber), New York (West), Kansas (Snow), Quebec (Winn and Beaulieu), Ontario (Gibson). Coquillett records New

Hampshire, Massachusetts 2, New Jersey, Maryland, District of Columbia, Virginia, and Missouri.

Type.—University of Kansas.

Hosts.—*Euthisanotia* (*Eudryas*) *grata* (Fabricius) 17, *Euthisanotia unio* Hübner 1, *Euthisanotia* sp. 3. Published and unpublished records not duplicated in above material: *Euthisanotia grata* (Brimley, Ely, and Tothill), *Euthisanotia unio* (Brimley); *Automeris io* (Fabricius) (Porter). Coquillett records *Acronycta* sp. (Koebele, Lugger, and Riley), *Acronycta luteicoma* Grote and Robinson (Riley), *Heterocampa marthesia* (Cramer) (Lugger), *Vanessa atalanta* (Linnaeus) (Sprague). The author feels that all but the first three host records should be viewed with some suspicion.

Remarks.—The foregoing description is based on 1 female "from the type lot of *eudryae*," Cornell University, reared from *Eudryas* (Comstock); 1 female, type specimen of Townsend's *thompsoni* (type, U.S.N.M. No. 19136), from *E. unio*, Dayton, Ohio (Jewett); 12 reared specimens bearing Gypsy Moth Laboratory note numbers, all reared from *E. grata* (1 male No. 12176 F1, from Castleton, Vt., having one fronto-orbital bristle on one side, agrees perfectly with Townsend's type description); 1 male from *E. grata* (Saunders); 1 male ex *E. grata*, Raleigh, N. C.; 1 male and 1 female from *Eudryas* (Dimmock); 1 male and 1 female from *E. grata* (Dimmock); 2 males from *E. grata* (Isely); 1 reared female (Riley); 4 males and 11 females collected by Brodie, Knab, and Shannon.

Brimley's record of rearing this species from *Estigmene acraea* most likely refers to a female of *Carcelia reclinata*, August 10, 1917, Raleigh, N. C. (Brimley).

Adults, April to August; number per host, one to eight; generations, one; hibernation, in puparium.

2. SISYROPA ALYPIAE, new species

Exorista eudryae Townsend, COQUILLETT (partim), U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 14, 1897.

Zenillia eudryae (Townsend) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 21-22, 1924.—ESSIG (partim), Insects of western North America, p. 581 (locality citation refers to *alypiae*), 1926.

Zenillia n. sp. (1) SCHIAFFNER and GRISWOLD, U. S. Dept. Agr. Misc. Publ. 188, p. 113, 1934.

Although somewhat larger, this species is very similar to *Sisyropa eudryae*. The differences have all been cited in the table to the species. Otherwise, the description is practically the same.

Male (type).—Head with front at narrowest about one-fourth width of head; frontal row of bristles, not including reclinate prevertical bristle, 10 in number on one side and 11 on other, extending down to base of third antennal joint; gena one-sixth eye height; face

and posterior orbit dark-smoky-silver pollinose; third antennal segment a little less than three times as long as second; arista tapering, slightly thickened on basal half, penultimate segment short; palpus yellow, infuscated at base, thickened and curved at tip, thickly beset with short black hairs which are longer toward base.

Thorax black, with a bluish tinge and covered with gray pollen; midtibia bearing 3 long bristles on anterolateral side, upper bristle nearly as strong as middle, lower not much smaller than upper, 1 smaller bristle about one-half size of upper bristle situated between it and middle bristle; hind tibia ciliate.

Abdomen with second segment having a faintly reddish spot on sides; third abdominal segment with a dense patch of hairs underneath on each side.

Length 10 mm.

Female (allotype).—Head with front at narrowest slightly less than one-third width of head; frontal bristles eight in number besides reclinate prevertical bristle; two pairs of proclinate fronto-orbital bristles; outer vertical present. Additional bristles on midtibia situated between normal three; pulvilli less than one-half length of those of male. Third abdominal segment lacking dense patch of hairs underneath on each side; sides of abdomen black. Otherwise description same as for male.

Length 9 mm.

The paratype material varies as follows from the descriptions: The frontal bristles in the male vary from 10 to 11 and in female from 7 to 9; the front in the male is 0.26 and 0.27 (in two specimens), the front in the female is 0.30 (in two specimens). The middle tibia usually has only three bristles on the anterolateral side, but some of larger specimens, especially females, have additional ones. In the male the reddish spot on the sides of the abdomen usually covers portions of the second and third segments.

Length 8 to 11 mm.

Puparium.—Large, subshining, dark rufescent brown. Spiracles shining black, slightly raised above the surface, separation space about equal to width of one plate. Above, between and below the spiracles, a prominent, ridgelike elevation much higher than stigmal plates, the elevation above crescent shaped and descending slightly on outer sides of stigmal plates. Each plate has three serpentine, yellowish spiracular entrances. Button large, round, well defined, centrally located on plate, spiracular entrances coming around on inner side. Anal opening comparatively small, far below the spiracles. Spiracles located about on longitudinal axis.

Length 8.5 mm., diameter 4 mm.

The larger puparium of *Sisyropa alypiæ* can be easily distinguished from the smaller *S. eudryæ*. The crescent-shaped elevation above the spiracles is not present in *S. eudryæ*. The stigmal plates are not so highly raised in *alypiæ*; the spiracular entrances are longer and more convoluted; the button is centrally located, whereas in *eudryæ* the button is located more on the inner side of the plate. The spiracles are located about on the longitudinal axis in *alypiæ*, whereas in *eudryæ* they are located on the upper side of the axis. The spiracles in *alypiæ* are separated by about the width of one stigmal plate; in *eudryæ* the separation width is about twice the width of one stigmal plate. The anal opening of *alypiæ* is smaller than that of *eudryæ*.

Type and allotype locality.—Somerville, Mass.

Distribution.—Vermont 1, Massachusetts 12, Montana 1, British Columbia 1. Published record: Missouri (Coquillett).

Type.—Male, U.S.N.M. No. 54149.

Hosts.—*Alypia octomaculata* (Fabricius) 35; *Psychomorpha epimensis* (Drury) (no host adults were recovered from this collection) 1. All previous published records referring to the recovery of *eudryæ* from *A. octomaculata* can probably be considered to be *alypiæ*.

Remarks.—The material examined consisted of 36 reared specimens bearing Gypsy Moth Laboratory note numbers (including the type and allotype No. 10017 M2; two male and two female paratypes, Lexington, Mass., No. 10017; one male and one female paratype, Boston, Mass., No. 10017 G2; one female paratype, Lynn, Mass., No. 10017 G3; one male paratype, Everett, Mass., No. 10017 L2a; one male and one female paratype, Revere, Mass., No. 10017 L3 and L3a; two male paratypes, Somerville, Mass., No. 10017 M2, M5; two female paratypes, Somerville, Mass., No. 10017 P1); one male, Kaslo, British Columbia, labeled "compared with type of *E. eudryæ* Towns. by Lawson" (Currie). (This specimen was discussed by Aldrich and Webber under *Zenillia eudryæ*; it is *alypiæ*); one male, Summit Station, Mont. (Aldrich). One female from Revere, Mass., Gypsy Moth Laboratory No. 10017 L3, has bare eyes (front 0.31).

Adults, May to July; number per host, one to three; generations, one; hibernation, in puparium.

6. Genus THELYMYIA Brauer and Bergenstamm

Thelymyia BRAUER and BERGENSTAMM, Denkschr. Akad. Wiss. Wien, math.-nat. Kl., vol. 58, p. 331, 1891.—TOWNSEND, Manual of myiology, pt. 4, p. 224, 1936. [Genotype, *T. loewii* Brauer and Bergenstamm. Monotypic. (*T. loewii*) = *Tachina saltuum* Meigen, 1824, Systematische Beschreibung der europäischen zweiflügeligen Insecten, vol. 4, pp. 155, 329, 1824.]

Exorista of COQUILLETT (nec Meigen) partim, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 94, 1897.

Zenillia of ALDRICH and WEBBER (nec Robineau-Desvoidy), partim, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 33, 1924.

This genus containing two Nearctic species is closely related to *Phryæ* (s. s.). The European authorities have difficulty in separating *Thelymyia* from *Exorista* of authors. A combination of characters, such as apical scutellars turned backward, palpi yellow, three post-sutural dorsocentral macrochaetae, and male with two proclinate fronto-orbital bristles, serves to separate *Thelymyia* from *Phryæ*. Townsend recognizes the close relationship of *Phryæ* and *Thelymyia* by placing them both in the tribe Lydellini.

KEY TO THE SPECIES OF THELYMYIA

1. Frontal orbit silvery gray, not noticeably black toward vertex; facial ridge bristly on lowest one-fourth or one-third; palpus yellow; thorax and scutellum gray-pollinose, with four black mesonotal vittae, scutellum black with extreme tip usually faintly yellow; sternopleural macrochaetae three; midtibia with two median anterolateral bristles; gray pollen of the abdomen fairly heavy and well defined; apical one-fourth to one-third of segments 2 and 3 and apical half of segment 4 sharply demarked and shining black; narrow dorsal abdominal vitta black and well defined; dorsal abdominal hairs in male depressed; bristles on fourth segment approaching macrochaetae in size in male only----- 1. *curriei* (Coquillett) (p. 104)
- Frontal orbit silvery gray but more blackish, becoming black toward vertex; gena dark blackish gray, subshining; facial ridge usually bristly half way; palpus yellow, slightly infuscated at base; thorax and scutellum covered with such a thin layer of pollen as to appear shining black; mesonotal stripes hardly distinguishable; sternopleural macrochaetae three or more (very variable); scutellum black; midtibia with three or four median anterolateral bristles; gray pollen of abdomen so thin and ill-defined as to appear shining black, pollen slightly more noticeable at base and sides of segments; dorsal abdominal vitta hardly distinguishable; fourth segment of female polished black; dorsal abdominal hairs in male erect; macrochaetae on fourth segment, those of male the same size as on third segment, those of female almost same size as third.

2. *erecta*, new species (p. 105)

1. THELYMYIA CURRIEI (Coquillett), new combination

Exorista curriei COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 94, 1897.

Zenillia curriei (Coquillett) ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 33-34, 1924.

This species closely resembles the genotype, *saltuum* (Meigen). Head with front of male at narrowest 0.35 to 0.39 and front of female 0.35 to 0.38 of head width; frontalia one-third width of front; frontal row of five to eight bristles plus two reclinate upper frontals, extending down to base of third antennal segment, two proclinate fronto-orbital bristles; male with small and female with outer vertical bristle; gena about one-seventh eye height; antenna black, length of third segment in male four to four and one-half and

in female three to three and one-half times as long as second segment; arista thickened on basal fourth, penultimate segment short.

Thorax gray-pollinose; three postsutural dorsocentral macrochaetae; three pairs of marginal and one shorter cruciate pair of apical scutellars, one pair of discal scutellars; three sternopleural macrochaetae; midtibia bearing two bristles on median anterolateral side and one inner ventral bristle; hind tibia with irregularly placed bristles of uneven length on anterolateral side; third vein with two or three bristles at base.

Abdomen black covered with gray pollen; entire first segment shining black; dorsal abdominal hairs depressed; first segment with a pair of marginal macrochaetae, second segment with a pair of discal and a pair of marginal macrochaetae, third segment with usually four discal macrochaetae in a line and a marginal row, fourth segment irregularly tipped with marginal and submarginal bristles approaching the size of macrochaetae in male only.

Length of type 8 mm.

Type locality.—University, Grand Forks, N. Dak.

Type.—Male, U.S.N.M. No. 3752 (Coquillett listed it as a female).

Distribution.—Wisconsin 3, North Dakota 2, South Dakota 1, Texas 1.

Host.—Unknown. The genotype, *Thelymyia saltuum*, has been recovered from *Catocala sponsa* (Linnaeus).

Remarks.—The description is based on the type male and on three males and three females collected by Aldrich, Baker, and Bishopp. Rolla P. Currie collected the type specimen. The times of collections ranged from April 19 in Texas to July 17 in Wisconsin.

2. THELYMYIA ERECTA, new species

Zenillia curriei (Coquillett) ALDRICH and WEBBER (partim), Proc. U. S. Nat. Mus., vol. 63, art. 17, pp. 33–34, 1924.

This species is very similar to *Thelymyia curriei*. The differences have all been cited in the key to the species (p. 104). Otherwise the species are practically the same.

Male (type).—Head with front at narrowest 0.37 head width; facial ridge bristly on one-half to two-fifths; gena one-sixth eye height, dark gray black, subshining; antenna black, third segment four times as long as second; arista thickened on basal one-third.

Thorax covered with such a thin layer of pollen as to appear shining black; sternopleural macrochaetae four on one side, five on the other; midtibia with four median anterolateral bristles on one side and two with one smaller on the other side.

Abdomen covered with such a thin layer of pollen as to appear

shining black, pollen arranged as in *curvici*, more noticeable at base and sides of segments; dorsal abdominal hairs erect; third segment with four discal macrochaetae in a row.

Female (allotype).—Front at narrowest 0.35 head width; length of third segment of antenna three and one-fourth times that of second; facial ridge bristly on lowest one-third; sternopleurals three plus an additional weak one on one side; mid tibia with three median anterolateral bristles. Dorsal abdominal hairs depressed; four discal macrochaetae on third segment not in a row; fourth segment polished black; otherwise description same as for male.

Paratypes (one male and one female).—This material varies as follows from the type and allotype notations: Front at narrowest in male 0.39, in female 0.37 head width; facial ridge of male bristly one-half, of female two-fifths; arista of male thickened on basal fourth. Sternopleurals three; midtibia of male with three and of female with four median bristles on anterolateral side, female with two inner ventral bristles; female with four discal macrochaetae on third segment in a row; abdomen of male noted as having exceptionally thin pollen.

Type and allotype locality.—Juliaetta, Idaho.

Type.—Male, U.S.N.M. No. 54141.

Host.—Unknown.

Remarks.—Three males and three females collected by Aldrich, including the type and allotype, Juliaetta, Idaho; including also one male and one female paratype, Lawyers Canyon, Idaho, on July 16, 1909; one male, Moscow, Idaho, July 8, 1916; and one female, Sweetwater, Idaho, June 17, 1930.

7. CHRYSOPHRYXE, new genus

The genus *Chrysophryxe* should be associated with the genera *Thelymyia* and *Phryxe*. The genus has many of the characteristics of *Phryxe*, namely, apical scutellars erect or proclinate, decussate; four postsutural dorsocentral macrochaetae; male without frontal-orbital bristles. *Chrysophryxe*, however, is predominantly golden pollinose with yellow palpi and a pair of true discal macrochaetae on the second and third abdominal segments.

1. CHRYSOPHRYXE TIBIALIS, new species, genotype

Chrysocxorista viridis TOWNSEND (partim), Proc. U. S. Nat. Mus., vol. 49, p. 435, 1915.

Male (type).—Head with front at narrowest 0.36 head width; frontal row of six bristles, extending from on a level with below arista to two reclinate preverticals; vertical and weak outer vertical bristle; facial ridge bristly on lowest one-fifth; gena one-fifth eye

height; frontal orbit and face golden-pollinose, lower side of face and gena more silvery; antenna black; arista thickened on basal two-fifths, penultimate segment longer than broad; palpus yellow, base infuscated.

Thorax black, sides silvery gray pollinose, dorsum golden pollinose; four black mesonotal vittae; four postsutural dorsocentral macrochaetae; scutellum with three pairs of marginal scutellars and one weak decussate apical pair turned upward, one pair of discal scutellars; three sternopleural macrochaetae; midtibia with one strong median anterolateral bristle, one strong inner ventral bristle; hind tibia ciliate, with one longer bristle; pulvilli short; wing with three bristles at base of third vein.

Abdomen black, venter of segments one, two, and three silvery gray pollinose; basal two-thirds of segments 2, 3, and 4 golden pollinose tinged with green, no dorsal vitta; dorsum of first segment shining black, apical margins of other segments shining brownish black; first and second segments with a pair and third segment with a row of marginal macrochaetae; second and third segments with a pair of discal macrochaetae; fourth segment irregularly tipped with bristles.

Length 9 mm.

Type locality.—Brazil.

Type.—Male, U.S.N.M. No. 54140.

Host.—Unknown.

Remarks.—Described from the type specimen, which was previously *Chrysocxorista viridis* Townsend, male allotype U.S.N.M. No. 19611.

The genitalia are similar to those of *Zenillia angustifrons* which Townsend designated as subspecies of *Chrysocxorista viridis*. *Z. angustifrons* possesses more *Zenillia*-like characteristics than the male described above.

8. ANGUSTIA, new genus

The genus *Angustia* should be associated with the genus *Aplomya*. *Angustia*, however, has only two sternopleural bristles, the frontal bristles descend to the middle of the second antennal segment, and the fourth segment of the abdomen is destitute of macrochaetae. The thorax and abdomen are wholly golden pollinose.

1. ANGUSTIA ANGUSTIVITTA (Aldrich and Webber) (genotype)

Zenillia angustivitta ALDRICH and WEBBER, Proc. U. S. Nat. Mus., vol. 63, art. 17, p. 18, 1924.

Head with front at narrowest 0.28 head width; frontal row of four bristles, extending from middle of second antennal segment to two

recline preverticals; facial ridge bristly on lowest one-fourth; gena one-fourth eye height and covered with fine white hairs; frontal orbit golden, face silver-white pollinose; antenna with first two segments and basal part of third yellow, third segment two and one-fourth times second; arista thickened on basal one-fourth, penultimate segment short; palpus pale yellow.

Thorax golden-pollinose, marked with four mesonotal vittae; three postsutural dorsocentral macrochaetae; scutellum golden pollinose, with three pairs of marginal scutellars and one decussate apical pair turned backward; two sternopleural macrochaetae; legs with coxae and femora yellow, tibiae brown, and tarsi black; midtibia with one median anterolateral bristle and inner ventral bristle; hind tibia roughly ciliate; no bristly hairs behind on apex of hind coxa; third vein with three to five bristles at base.

Abdomen reddish yellow, golden pollinose; first and second segments with a pair of discal macrochaetae; first and second segments with a pair and third with a row of marginal macrochaetae; fourth segment covered with a few scattered small bristles; abdominal hairs depressed.

Length 8 mm.

Type locality.—Fort Wadsworth, Staten Island, N. Y.

Distribution.—New York 1, Pennsylvania 1.

Type.—Female, U.S.N.M. No. 25701.

Host.—Unknown.

Remarks.—The material examined consisted of the type specimen, July 16, 1917, and one female, Swarthmore, Pa., June 18, 1906.



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A NEW FOSSIL REPTILE FROM THE UPPER CRETACEOUS OF UTAH

By CHARLES W. GILMORE

In 1939 the Smithsonian Paleontological Expedition discovered the fragmentary skeletal remains of a small reptile in the Upper Cretaceous of the North Horn Mountain area in central Utah. The diminutive size of this individual, its amphicoelous vertebrae, and a dermal armor form a combination of features previously unknown among the extinct Reptilia of the Upper Cretaceous, and although the skeletal remains are meager this unique specimen is described as a new species of a new genus and referred provisionally to the Crocodilia.

PINACOSUCHUS MANTIENSIS, new genus and species

Type.—U. S. N. M. No. 16592, consisting of a maxillary fragment, 7 vertebral centra, proximal end of coracoid, shaft of femur, and numerous dermal scutes and spines, with various fragments. Collected in 1939.

Locality.—"Lizard locality," South Dragon, Manti National Forest, Emery County, Utah.

Horizon.—North Horn formation, Upper Cretaceous.

Diagnosis.—Teeth thecodont; vertebrae amphicoelous; two sacral vertebrae; caudal vertebrae chevron bearing; dermal armor, consisting of sharp, rounded spines; spined, plain, and ridged scutes; limb bone with large medullary cavity. Individual small.

The scanty skeletal materials comprising the type specimen were found in a small cluster on the surface of the exfoliated matrix, and

as the bones were of corresponding size and there was no apparent duplication of parts it is assumed that all pertain to the skeleton of a single individual.

A small fragment of the left maxillary (fig. 1, *A*) is the only recognizable skull part of this specimen preserved. It shows the external surface of the bone to have been sculptured. Alveoli for three teeth indicate the thecodont nature of their attachment and the ovate shape of their roots, with the longer diameter longitudinal.

In all there are seven complete vertebral centra and fragmentary parts of several others. Dorsal, sacral, and caudal vertebrae can certainly be recognized, and there is one centrum that is provisionally identified as pertaining to the axis. It differs from all others in



FIGURE 1.—Skeletal parts of *Pinacosuchus mantiensis*, type (U. S. N. M. No. 16592): *A*, Maxillary fragment; *B*, proximal end of left coracoid. Both figures three times natural size.

having a flattened anterior articular end, on each side of which are small facets that look forward and outward. This centrum is depressed and is wider in front than behind, with a broadly rounded ventral surface as shown in figure 2. The posterior articular end is cupped. The centrum has a greatest length of 9 mm. and a greatest width of 7.5 mm.

Two dorsal centra differ in that one is compressed and the other depressed. It is thought that the former pertains to the anterior dorsal region, the latter to the posterior part of the presacral series. Both have small portions of the neural arch present, but the absence of any trace of the sutural connections with the centra suggests the adult age of the individual. Both have evenly rounded ventral surfaces without trace of a keel. The anterior dorsal centrum measures 8 mm. in length, the posterior one 7 mm.

The two sacral centra (fig. 3) were found detached from each other, but their roughened sutural ends made perfect articulation. These centra have a combined length of 14.3 mm. The centra are depressed, with cupped, ovate, articular ends and broadly rounded ventral surfaces. Sacral ribs attach with the center of the centra.

The anterior caudal centrum, shown in figure 4, *A*, has quadrangular cupped ends and portions of heavy, transverse processes. The ventral surface is shallowly channeled longitudinally. A second caudal centrum (figure 4, *B*) is more elongated than the one previously mentioned. Its ventral surface is also shallowly channeled, with distinctly developed chevron facets on the posterior end. It is



FIGURE 2.—Centrum of ?axis of *Pinacosuchus mantiensis*, type (U. S. N. M. No. 16592): *A*, Ventral view; *B*, anterior view. Both figures twice natural size.

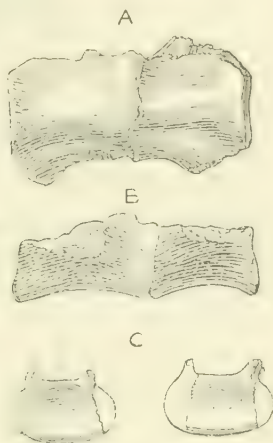


FIGURE 3.—Sacrum of *Pinacosuchus mantiensis*, type (U. S. N. M. No. 16592): *A*, Ventral view; *B*, lateral view; *C*, end Views. All figures twice natural size.

evident that this vertebra also bore transverse processes, thus indicating that it belonged to the anterior half of the tail.

Coracoid.—The articular end of a flat bone (fig. 1, *B*) perforated by a circular foramen is tentatively identified as the proximal portion of the left coracoid. Except for the scapular border being convex, it has its closest resemblance with the coracoid of the crocodile. It shows the same transverse thickening of the articular contribution to the glenoid socket and the same hooklike process overhanging the missing shaft of the bone, below the glenoid cavity. The placement of the coracoid foramen is similar.

Femur.—The bent shaft of a limb bone preserved with this specimen is provisionally identified as being that of a femur. It has a large medullary cavity and at the center is round in cross section.

Dermal ossifications.—The dermal armor of *Pinacosuchus mantiensis* displays no less than five different types of ossification: (1) Simple, thin, flat, rectangular scutes; (2) ridged rooflike scutes (fig. 5, *C*); (3) thickened subrectangular scutes, having sharp, asymmetrically placed spine that strongly overhangs the borders (fig. 5, *D*); (4) small pointed spines with thickened bases (fig. 5, *A*); (5) more elongate pointed spines with thickened bases (fig. 5, *B*). All have sculptured surfaces.

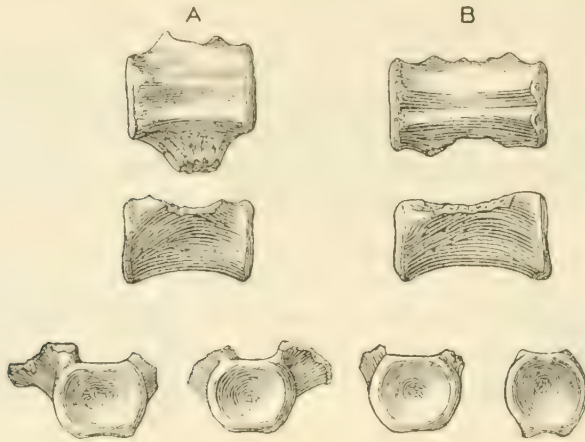


FIGURE 4.—Caudal vertebrae of *Pinacosuchus mantiensis*, type (U. S. N. M. No. 16592): *A*, Anterior caudal centrum, ventral, lateral, and end views; *B*, more posterior caudal centrum, ventral, lateral, and end views. All figures twice natural size.

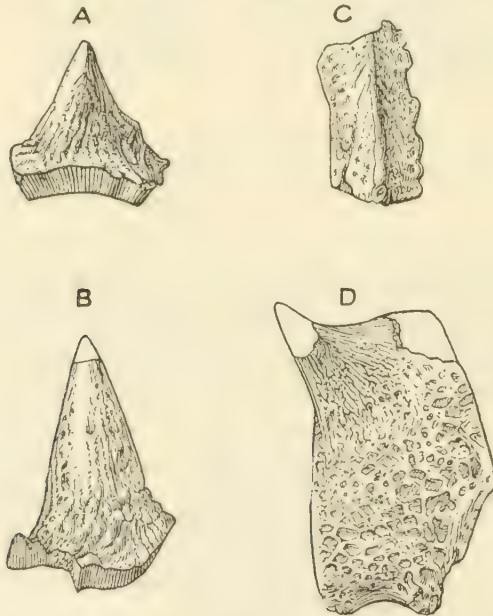


FIGURE 5.—Dermal spines and scutes of *Pinacosuchus mantiensis*, type (U. S. N. M. No. 16592): *A*, Short spine; *B*, elongate spine; *C*, ridged scute; *D*, asymmetrical spined scute. All three times natural size.

All these dermal structures were found disassociated in the matrix, and thus no clue has been obtained as to the disposition or arrangement of these ossifications in the skin. That they were a portion of an elaborate ornamentation is clearly evident.

RELATIONSHIPS

At the present time so little is known of the skeletal structure of *Pinacosuchus mantiensis* that I have been unable to arrive at a satisfactory conclusion as to its true ordinal affinities. Of the 14 reptilian orders recognized by Woodward¹ the specimen under discussion can be satisfactorily eliminated from 10. This leaves the Squamata, Thecodontia, Crocodilia, and Dinosauria, and it is in one of these orders that this specimen will eventually find a permanent resting place.

The presence of a thecodont dentition and the amphicoelous vertebrae would appear to rule it out of the Squamata, for with the exception of the Gekkota, which have amphicoelous vertebrae but always combined with an acrodont dentition and absence of bony scutes, all other lizards and all other members of the order have procoelous vertebrae.

That this specimen could be referred to the Dinosauria seems highly improbable, for although the primary number of sacral vertebrae in this order may have been two, no Upper Cretaceous dinosaur is known having less than five, and several genera have many more than that. This reason alone would appear sufficient to exclude *Pinacosuchus*.

The order Thecodontia is a generalized group from which it is thought by some authorities that both the Crocodilia and the Dinosauria may have been derived, but the suborder Pseudosuchia contains a considerable number of lizard-shaped land reptiles of small size that have such a diversity of structure that their location here must be regarded as provisional. As a repository for genera of uncertain ordinal affinities the Pseudosuchia would seem to be the logical reference of *Pinacosuchus*. The few structural features known would not be in particular discord with such an assignment, but the fact that all the referred genera are of Triassic age or older leads one to doubt the advisability of such an assignment.

Amphicoelian crocodilians are known to have persisted into the Upper Cretaceous (Benton), and the present specimen presents a few characteristics that suggest crocodilian relationships. Reference is made to the thecodont dentition, sacrum of two vertebrae, presence of bony skin scutes, close resemblance of incomplete coracoid to that of the crocodile, and a sculpture of the maxillary surface closely simulating that of many crocodilians. Meager and unsatisfactory though the evidence may be, none of the more important characters

¹ Woodward, A. Smith, Zittel's "Textbook of Paleontology," vol. 2, pp. 233-427, 1932.

displayed by the present materials except the ornate character of the scutes are opposed to its inclusion in the Crocodilia, and therefore *Pinacosuchus* is provisionally referred to this order until such time as the discovery of more complete specimens shall disclose its true ordinal relationships.



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SOME AMERICAN GEOMETRID MOTHS OF THE SUB-
FAMILY ENNOMINAE HERETOFORE ASSOCIATED
WITH OR CLOSELY RELATED TO *ELLOPIA* TRE-
ITSCHKE

By HAHN W. CAPPS

FOR SOME time it has been apparent that the species assigned to the genus *Ellopia* Treitschke or *Therina* Hübner in our check lists¹ of North American Lepidoptera are not a homogeneous group considered on the basis of characters believed to indicate natural affinity and have needed reclassification. As originally planned, this paper was to be confined to the treatment of the species north of Mexico, but as the work progressed it became apparent that none of the American forms is congeneric with the European species *Therina fasciaria* (Linnaeus), genotype of *Ellopia* Treitschke and *Therina* Hübner. Furthermore, no species of true *Ellopia* occurs in the New World. In order to determine the relative value of characters for defining specific and generic categories, the scope of the paper was enlarged to include species occurring in Mexico, Central America, and South America which had previously been assigned to the genus or are obviously closely related to it.

This study is based on material in the collection of the United States National Museum supplemented by specimens borrowed from the collections of the Universities of Kansas and Michigan and that of John L. Sperry, and on types examined at the Academy of Natural Sciences of Philadelphia and Rutgers University. More than 800 specimens

¹ Hulst, U. S. Nat. Mus. Bull. 52, 1903 (part); Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, 1917; McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), 1938.

were studied, and to ascertain intraspecific variation of larval, venational, and genitalic structures approximately 300 microscopic slide mounts were prepared. The number of slide mounts for a species varies from 1 to 36, depending on the amount of material on hand.

Because there has been much confusion of the species in the literature, citations for food plants and localities are based entirely on labels associated with specimens examined by the author, unless specified otherwise. Much of this confounding of the species has probably been due to three factors: (1) Close similarity of the species, (2) extremely great intraspecific variation, and (3) lack of sufficient material to indicate or determine the range of intraspecific variation. The author strongly suspects that extensive collecting and rearing will, in the future, make untenable some of the forms that it now appears desirable to retain as food plant or geographical varieties.

The following brief diagnosis of *fasciaria* (Linnaeus), the genotype of *Therina*, is offered for comparative purposes: Male antenna bipectinate to apex; female antenna simple. Fore wing (fig. 3) with 12 veins, 10 and 11 from the cell; without areoles. Male genitalia (fig. 4) without gnathos; harpe with middle narrowly constricted, a costal arm from near base; vinculum well developed, narrowly extenuated; furca simple; aedeagus bifurcate. Female genitalia (fig. 20) with signum a small, weakly sclerotized plate. Larva with prolegs on fifth abdominal segment.

All the American forms treated here differ from *fasciaria* in the following respects: Fore wing (figs. 1, 2) with two areoles. Male genitalia (fig. 7); harpe simple, not constricted at middle, costa without an arm; vinculum not extenuated; aedeagus simple. Female genitalia (fig. 21) with signum a strongly sclerotized stellate, serrate or spinose plate. Larva without prolegs on fifth abdominal segment. In genitalia, they resemble species of *Nepytia* Hulst and *Cingilia* Walker. *Cingilia*, however, has a vestige of vein 5 at the margin of the hind wing and species of *Nepytia* are distinguishable by the crenulate or denticulate character of the transverse lines of fore wing.

Few studies of a revisional nature treating this subfamily have appeared, and though the four genera discussed in this paper do not constitute a recognized or definable group of supergeneric rank the following characters are common to the group and are cited to avoid repetition in generic descriptions: Male antennae bipectinate, plumose; pectinations not clavate, sometimes terminating before apex. Labial palpus slender, extending but slightly beyond the front; front evenly rounded, scales closely appressed. Fore wing (figs. 1, 2) broad; transverse posterior line, if present, from costa well before apex; 12 veins and 2 elongate areoles; vein 12 anastomosing with 11 and then separate to costa; 10 and 11 from cell; 8 and 9 stalked; 2 from cell

well before outer angle; 3 and 4 approximate at base; 1b bifurcate near base; fovea absent; male with a bar-like structure near base between cubitus and 1b. Hind wing (fig. 1A) broad; transverse line, if present, appearing as a continuation of the transverse posterior line of the fore wing; outer margin slightly or strongly produced at vein 4 (removal of scales often necessary to note this); veins 6 and 7 approximate from cell [except the genus *Evita* (fig. 2A) in which they are stalked].

Male genitalia: Uncus simple, strong, hooklike; socii short or rudimentary; gnathos well developed with numerous spines; harpe simple; lateral arms of anellus strongly sclerotized, extending almost to costa of harpe; furca simple, only the right branch developed (in ventral view); aedeagus slender, cylindrical, narrowed posteriorly, distal end with a rather strongly sclerotized attenuated platelike structure with the margin serrate or scobinate.

Female genitalia: Signum a strongly sclerotized plate, margin serrate or spinose; ductus bursae strongly sclerotized or with a narrow, more or less complete internal sclerotized band posteriorly near junction with bursa copulatrix; ductus seminalis from near junction of ductus bursae and the bursa.

The variability in the shape of the wings and venation, particularly the fore wing, prevents extensive use of such characters as the origin of the veins, degree of anastomosis, stalking, or size and shape of the areoles for separating genera of the Ennominae. Hence, as has proved useful to other workers seeking a more natural classification of difficult groups, the employment of genitalic structures for the restriction of genera when other characters were unsatisfactory appears to be adaptable to the development of a more desirable rearrangement of the species of this subfamily, and on this basis the author has undertaken a study of the American Ennominae and is preparing a revision of the group.

KEY TO THE GENERA

1. Hind wing with veins 6 and 7 stalked.....*Evita*, new genus
Hind wing with veins 6 and 7 not stalked 2
2. Fore wing with 3 transverse lines.....*Besma*, new genus
Fore wing with 2 transverse lines..... 3
3. Aedeagus of male with a rather strongly sclerotized bifurcate plate distoventrally; ventral margin of genital opening of female bordered by a narrow, strongly concave, sclerotized band; central area of signum with spinules.....*Neotherina* Dognin
Aedeagus of male without a sclerotized bifurcate plate distoventrally; ventral margin of female genital opening not bordered by a sclerotized band; central area of signum without spinules
.....*Lambdina*, new genus

Genus NEOTHERINA Dognin

Neotherina DOGNIN, Ann. Soc. Ent. Belgium, vol. 57, p. 402, 1913. (Genotype: *Neotherina inconspicua* Dognin.)

In addition to characters noted for the group: Apex of male antenna simple. Fore wing with two transverse lines, evenly curved; hind wing with one transverse line. Male genitalia with gnathos armed with long slender spines; aedeagus with a sclerotized bifurcate plate distoventrally. Female genitalia with a strongly sclerotized, narrow concave band bordering ventral margin of genital opening; signum a strongly sclerotized plate, central area with spinules, margin spinose or serrate.

Remarks.—*Neotherina* Dognin does not appear in the nomenclators of either Schulze or Neave. The name was used, apparently for the first time in the literature, for a new species, *inconspicua*, described by Dognin in 1913 without any generic diagnosis. Dognin stated that *inconspicua* resembled *Neotherina axion* (Druce) but with the lines different, thus assigning *Therina axion* Druce to the genus. An examination of the type will be necessary to determine the true position of *axion*, but from the figures² representing it I suspect that it is more closely related to *Lambdina calidaria* (Dyar) and possibly synonymous with it.

The Dognin species, *inconspicua*, also resembles *Therina axona* Druce, but differences in genitalic structure place them in separate genera; the latter is referable to *Destutia* Grossbeck.

Superficially, the species of *Neotherina* resemble those of *Lambdina*; the males, however, are easily separable by the simple apex of the antenna and furcate plate of the aedeagus and the females by the concave sclerotized band near ventral margin of genital opening. Some species of *Besma* have similar genitalia but are easily separated by the three transverse lines on fore wing.

KEY TO SPECIES OF NEOTHERINA

- | | |
|--|--------------------------------|
| 1. Hind wing with a medial transverse line passing through outer angle of discal cell..... | 1. <i>inconspicua</i> Dognin |
| Hind wing with a postmedial transverse line, well beyond outer angle of discal cell..... | 2. ♂ <i>imperilla</i> (Dognin) |
| | 3. ♀ <i>consequens</i> (Prout) |

1. NEOTHERINA INCONSPICUA Dognin

PLATE 2, FIGURES 5-5C; PLATE 9, FIGURES 27-27A

Neotherina inconspicua DOGNIN, Ann. Soc. Ent. Belgium, vol. 57, p. 402, 1913.

Male.—Head and collar yellow; palpus yellowish, second and third joints irrorated with fuscous scales. Thorax and wings ochereous with

² Druce, in *Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera*, vol. 3, tab. 45, figs. 25, 26, 1881-1900.

a red-brown tinge. Fore wing with the transverse anterior line evenly curved; transverse posterior line straight from costa to vein 6 and then slightly angled inwardly to inner margin. Medial transverse line of the hind wing straight or very slightly curved. All lines testaceous edged with yellow.

Alar expanse, 29–34 mm.

Genitalia (figs. 5–5A): Uncus a strong hook, gradually expanding basally; harpe simple, rather stout, costa short, its length less than width of harpe at base; furca extending to or beyond costa of harpe, distal end bent mesad, angled portion armed with numerous fine spines; aedeagus with a narrow extenuated plate distally and a large patch of long slender cornuti.

Female.—Similar to the male in color and markings.

Alar expanse, 32–36 mm.

Genitalia (figs. 27–27A): Ventral operculum moderately sclerotized, weaker posteriorly; ductus bursae rather long, more than twice the length of internal band near junction with the bursa; bursa narrow, elongate; signum a narrow spinose plate.

Type.—U.S.N.M. No. 31153.

Type locality.—Lino, Panama.

Food plant.—Unknown.

Distribution.—COSTA RICA: Juan Vinas (Jan., June). GUATEMALA: Chejel (June), Guatemala City (June). MEXICO: Jalapa, Orizaba (Sept.). PANAMA: Lino.

Nine specimens examined.

Remarks.—As stated previously, the genitalic structures are extremely variable for the whole group. Figures 5B and 5C indicate the intraspecific variation of the gnathos and furca for this species.

2. NEOTHERINA IMPERILLA (Dognin), new combination

PLATE 2, FIGURE 6, 6A

Nephodia imperilla DOGNIN, Hétérocères nouveaux de l'Amérique du Sud, fasc. 4, p. 21, 1911.

Male.—Front pale brown, slightly ochereous; abdomen and wings gray-brown with a slight reddish tinge. Fore wing with two testaceous transverse lines; transverse anterior line evenly curved; transverse posterior line straight from costa to vein 6 and then evenly bent inwardly to inner margin. Hind wing with a post-medial line, evenly curved, well beyond outer angle of the discal cell.

Alar expanse, 36 mm.

Genitalia (figs. 6, 6A) similar to those of *inconspicua*; distal spined portion of furca smaller; fewer cornuti.

Female.—Unknown.

Type.—U.S.N.M. No. 32660.

Type locality.—Cañon de Tolima (1,700 meters), Colombia.

Remarks.—The species is represented in the National Museum collection only by the holotype, and this is in rather poor condition. It resembles *inconspicua*, but the general color is more testaceous and it lacks the chrome-yellow on head, collar, and borders of the transverse lines. The postmedial line of the hind wing of *imperilla* is evenly curved and beyond the outer angle of the cell; that of *inconspicua* is more nearly medial, almost straight, and passes through the outer angle of the cell.

3. NEOTHERINA CONSEQUENS (Prout), new combination

PLATE 9, FIGURE 28

Nephodia (*Nipteria*) *consequens* PROUT, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 524, 1910.

Male.—Unknown.

Female.—Similar to *imperilla* in color and markings.

Alar expanse, 42 mm.

Genitalia (fig. 28) similar to those of *inconspicua* but with the signum flatter and broader and the margin serrate instead of spinose.

Type.—In British Museum.

Type locality.—Santo Domingo, Carabaya, Peru.

Food plant.—Unknown.

Remarks.—The species is represented in the National Museum collection by a single specimen. Prout stated that he had seen one specimen in addition to the type from the same locality. Presumably this is the one in the National Museum, since the label indicates the type locality and the specimen was a part of the Dognin collection.

Eventually *imperilla* and *consequens* may prove to be opposite sexes of one species, but until this is verified by the examination of material (including both sexes) from the two regions they should be treated as distinct species.

LAMBDINA, new genus

Genotype.—*Ellopia fiscellaria* Guenée.

With characters noted for the group and in addition: Antenna of male bipectinate to apex. Fore wing broad with two transverse lines, the transverse posterior line from costa well before apex. Hind wing with a single transverse line, occasionally indistinct; veins 6 and 7 approximate. Male genitalia with gnathos armed with numerous coarse spines; aedeagus without a distoventral bifurcate plate. Female genitalia with signum a broad, strongly sclerotized plate, central area without spinules, margin serrate; ventral margin of the genital opening not bordered by a continuous sclerotized band.

Remarks.—The species of *Lambdina* closely resemble those of *Neotherina* but are easily separated by genitalic characters. In *Lambdina* the aedeagus is without a distoventral sclerotized furcate plate; there is no concave sclerotized band bordering the ventral margin of the female genital opening and the central area of the signum is without spines and comparatively smooth.

Because of variability in color, maculation, and genitalia within the genus it is impossible to make satisfactory keys. The following keys are offered merely to help in identification of the species and should be used with caution. For similar reasons it is impracticable to include subspecific categories and these are omitted from the keys.

KEY TO SPECIES OF LAMBDA

Males

- | | |
|--|-------------------------|
| 1. American species north of Mexico ³ | 2 |
| Mexican and Central American species..... | 4 |
| 2. Furca long, slender, laterally compressed..... | 3 |
| Furca short, stout, not compressed..... | 14. punctata (Hulst) |
| 3. Fore wing with transverse lines evenly curved, diffuse or rather indistinct, accentuated by fuscous dots on veins..... | 9. athasaria (Walker) |
| Fore wing with transverse lines sinuate, rather sharply defined, if nearly straight or evenly curved not strongly accentuated on veins by fuscous dots..... | 2. fiscellaria (Guenée) |
| 4. Fore wing broad; transverse lines indistinct, accentuated by fuscous dots on veins. Aedeagus somewhat extenuated posteriorly; a large patch of cornuti..... | 13. negata (Dyar) |
| Fore wing narrower; transverse lines rather distinct, only slightly if accentuated on veins. Aedeagus strongly extenuated posteriorly; a small patch of cornuti..... | 7. axion (Druce) |

Females

- | | |
|---|-------------------------|
| 1. American species north of Mexico..... | 2 |
| Mexican and Central American species..... | 4 |
| 2. With ventral operculum strongly sclerotized..... | 3 |
| Without a strongly sclerotized ventral operculum..... | 14. punctata (Hulst) |
| 3. Fore wing with transverse lines evenly curved, diffuse or rather indistinct, accentuated by fuscous dots on veins..... | 9. athasaria (Walker) |
| Fore wing with transverse lines sinuate, rather sharply defined, if nearly straight or evenly curved not strongly accentuated on veins by fuscous dots..... | 2. fiscellaria (Guenée) |
| 4. Ductus bursae at least three times as long as posterior internal band..... | 7. axion (Druce) |
| Ductus bursae shorter, less than three times length of posterior internal band..... | 5 |
| 5. Posterior internal band of ductus bursae extenuate posteriorly..... | 8. calidaria (Dyar) |
| Posterior internal band of ductus bursae not extenuate posteriorly..... | 13. negata (Dyar) |

³The Hübner species, *fervidaria*, is omitted because the type has been lost, and there is no certainty as to just what it represents.

1. *LAMBIDINA FERVIDARIA* (Hübner)

Therina fervidaria HÜBNER, in Geyer, *Zuträge zur Sammlung exotischer Schmetterlinge*, vol. 3, p. 8, No. 205, figs. 409, 410, 1831.—HULST, U. S. Nat. Mus. Bull. 52, p. 334, 1903 (part).

Eltopia fervidaria (Hübner) GUENÉE, *Histoire naturelle des insectes lépidoptères*, vol. 9, p. 132, 1857.—BARNES and McDUNNOUGH, *Check list of the Lepidoptera of Boreal America*, No. 4655, 1917.—McDUNNOUGH, *Check list of the Lepidoptera of Canada and the United States of America* (Part 1, *Macrolepidoptera*), No. 4159, 1938.

Male.—Unknown except for the "Hübner" figure illustrating the species, from which this description is prepared.

Head, thorax, abdomen, and upper surface of wings uniformly brownish ocher, with a conspicuous sprinkling of fuscous on costal area of fore wing extending from base of wing to posterior transverse line, fuscous irroration stronger basally; a narrow border similarly dusted with fuscous along outer margins of fore and hind wings. Transverse lines and discal dots dark brownish ocher with conspicuous ocherous borders, evenly curved (not strongly sinuate). Fore wing with transverse posterior line extending from costa slightly outward to vein 4 and then slightly curved inwardly to inner margin. Hind wing with the postmedial transverse line slightly bent or evenly curved. Outer margins of both wings slightly angular; hind wing with a slight production indicated between veins 3 and 4 (normally this should occur at vein 4).

Under surface of the wings pale ocherous along costa and the outer margins; a somewhat darker brownish ocherous suffusion extending basally from transverse posterior line of fore wing and the postmedial transverse line of the hind wing. Abdomen, thorax, legs and collar irrorated with fuscous. Discal dot and anterior transverse line of fore wing obsolete; transverse posterior line faintly defined; postmedial transverse line of the hind wing similarly indicated.

Alar expanse, 35 mm.

Female.—Unknown.

Type.—Lost (?)

Type locality.—Georgia.

Food plant.—Unknown.

Remarks.—The figures illustrating *fervidaria* in the original German edition are not identical with those of the English facsimile of the *Zuträge*. In the figures of the latter work, the conspicuous ocherous borders of the transverse lines are absent and the outer margins of the wings are slightly more rounded, resembling those of *pellucidaria*.

I have seen no example of any species of *Lambidina* that agrees in detail with Hübner's figure, nor any specimens of *Lambidina* from the type locality except a few examples of *pellucidaria*, which is evidently

not what Hübner had. Presumably *fervidaria* represents an oak-feeding form and is, in my opinion, nothing but a color variety or race of *fiscellaria*. If this should prove to be true, Hübner's name will take precedence and have to be applied to the complex now under *fiscellaria*.

2. LAMBDA FISCELLARIA FISCELLARIA (Guenée)

PLATE 1, FIGURES 1, 1A; PLATE 3, FIGURES 7, 7A; PLATE 8, FIGURE 21.

Ellopiia fiscellaria GUENÉE, Histoire naturelle des insectes lépidoptères, vol. 9, p. 133, 1857.—BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4654, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5146, 1938.

Therina fiscellaria (Guenée) HULST, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Ellopiia flagitaria GUENÉE, Histoire naturelle des insectes lépidoptères, vol. 9, p. 133, 1857. (New synonymy.)

Therina fiscellaria var. *peccataria* SWETT, Psyche, vol. 16, p. 96, 1909.

Therina fiscellaria var. *johnsoni* SWETT, Can. Ent., vol. 45, p. 174, 1913.

Ellopiia turbataria BARNES and McDUNNOUGH, Contr. Nat. Hist. Lepid. North America, vol. 3, No. 4, p. 255, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5148, 1938. (New synonymy.)

Male.—Color variable, ranging from a uniformly pale whitish ocher to smoky fuscous; ocherous forms variable in the degree of sprinkling of fuscous scales.

Forewing with two transverse lines, darker than the ground color, sinuate or evenly curved and rather sharply defined; occasionally with the area between the lines somewhat darkly suffused; transverse anterior line from costa well before middle of the wing, usually edged inwardly with ocherous; transverse posterior line from costa well before the apex, usually edged outwardly with ocherous.

Hind wing with a single transverse line, usually edged outwardly with ocher; outer margin produced at vein 4.

Alar expanse, 32–45 mm.

Genitalia (figs. 7, 7A): Gnathos broad, with numerous coarse spines; furca long, extending almost to or beyond costa of harpe, compressed laterally, with spinules along dorsal surface; anellus broad, moderately sclerotized, somewhat scobinate with the scobinations stronger basally, lateral arms strongly sclerotized, long and extending almost to costa of harpe; aedeagus armed distally and ventrally with an extenuated sclerotized structure which is scobinate along the margin; penis with a patch of long, slender, deciduous cornuti.

Female.—Similar to male in color and markings.

Alar expanse, 30–40 mm.

Genitalia (fig. 21): Ventral operculum strongly sclerotized; ventral margin of genital opening without a bordering sclerotized band;

ductus bursae with a narrow, sclerotized internal band near junction with the bursa; signum a broad, strongly sclerotized, concave plate with serrate margin.

Types.—In the United States National Museum (*fiscellaria*, No. 55719; *turbataria*, No. 55721); Boston Society of Natural History (*johnsoni*, *peccataria*); British Museum (?) (*flagitiaria*).

Type localities.—"Amérique Septentrionale" (*fiscellaria*); Maine (*johnsoni*); Massachusetts (*peccataria*); New York, Canada (*flagitiaria*).

Food plants.—*Abies*, *Quercus*, *Tsuga*.

Distribution.—UNITED STATES: *Connecticut* (Aug., Sept.), *Illinois* (Aug., Sept.), *Iowa* (Sept.), *Maine* (Sept.), *Massachusetts* (Sept.), *Michigan* (May, Aug., Sept.), *New Hampshire*, *New Jersey*, *New York* (Aug.), *Pennsylvania* (Sept., Oct., Nov.), *Rhode Island* (Aug.), *Wisconsin*. CANADA: *Manitoba* (July, Aug., Sept.), *Ontario* (Aug., Sept.), *Quebec* (Sept.).

One hundred and seventy-seven specimens examined.

Remarks.—Four names listed as synonyms of *fiscellaria* are considered unworthy of subspecific status because they are based on either aberrant or inconstant variations. Specimens exhibiting melanism in varying degrees are not unusual in the group. The evidence in each case is briefly reviewed:

The name *flagitiaria* is based on rather pale ochereous specimens showing a somewhat smoky suffusion between the transverse lines, the suffusion more intense adjacent to the lines. While this form is easily separable from the paler and less distinctly marked specimens of *fiscellaria*, many intergrading specimens occur. Similar color variations occur within a series of *somnaria* and *lugubrosa*.

Swett's *peccataria* is based on a pale ochereous form with a slight fuscous suffusion on the fore wing between the transverse anterior line and the base of the wing and with a similar suffusion beyond the transverse posterior line, the suffusion broader and somewhat stronger below vein 4 and extending to the inner margin. Hind wing with a similar suffusion below vein 4, extending to inner margin. One of the specimens of *peccataria* is from Connecticut and was reared on *Quercus*. I have before me several specimens from Maine, reared on *Abies*, with a similar color pattern but with the ground color slightly darker and the suffusion stronger. I consider these and Swett's *peccataria* to be merely aberrants.

The name *johnsoni* is based on a dark smoky form, with the upper surface of wings rather smooth, somewhat sheeny, the transverse lines usually with bright yellow borders. This is merely a very dark melanic form of *fiscellaria*. Intergrades occur in material from Massachusetts and Michigan. Swett described *johnsoni* from a single male specimen.

Barnes and McDunnough dissected a male paratype of *turbataria* and commented on the possible unreliability of the genitalic characters used for separating it from *fiscellaria*. I have dissected the type, and the genitalia as compared with those of the paratype are as follows: Furca longer, slightly stouter, with the spinules more numerous, extending to base; anellus more scobinate; aedeagus, with a large patch of cornuti (deciduous). On the basis of the genitalia the type is inseparable from examples of *fiscellaria*.

There are specimens from Michigan, Massachusetts, Nebraska, and New York agreeing in habitus and maculation with typical *turbataria* from Pennsylvania. From Connecticut there are examples which intergrade between the so-called *turbataria* and typical *fiscellaria*. The name *turbataria*, I believe, represents nothing more than a color form; certainly it cannot designate any local race. The course of the posterior transverse line of the wing is not constant in a series.

3. LAMBDINA FISCELLARIA SOMNIARIA (Hulst)

Ellopiia somniaria HULST, Ent. Amer., vol. 1, p. 208, 1886.—BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4657, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5147, 1938.
Therina fervidaria somniaria (Hulst) HULST, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Male.—Similar to *fiscellaria* but specimens of *somniaria* averaging larger, slightly darker ochereous, more heavily dusted with fuscous, and with the transverse lines more distinct.

Alar expanse, 28–48 mm.

Genitalia like those of *fiscellaria*.

Female.—Similar to male in color and markings.

Alar expanse, 32–40 mm.

Genitalia like those of *fiscellaria*.

Type.—In Rutgers College collection.

Type localities.—Oregon, "Washington Territory," and Vancouver Island.

Food plant.—*Quercus*.

Distribution.—UNITED STATES: *California*, *Oregon* (Aug., Sept.), *Washington* (Aug., Sept.). CANADA: *British Columbia* (Aug., Sept.), *Vancouver Island*.

One hundred and twenty-five specimens examined.

Remarks.—On the average, specimens of *somniaria* are larger, a slightly ochereous with the dusting of fuscous more intense and with the transverse lines more distinct than in specimens of typical *fiscellaria*. The tendency of *somniaria* to be more uniform in size, color, and maculation is probably due to the fact that most of the material originated in a somewhat restricted area (northwestern United

States and the adjacent Canadian region) where climatic conditions are rather constant and *Quercus garryana* is the prevailing oak. Two specimens from California, however, are indistinguishable from eastern examples of typical *fiscellaria*; one is from Plumas County, the other bears no additional label, and their food plant is unknown.

The area of distribution for typical *fiscellaria* is much greater than that of *somniaria* and the notable variation in a series of *fiscellaria* is probably effected by the more variable prevalent climatic conditions and the presence of several kinds of food material on which it feeds. Several species of *Quercus*, *Abies*, and *Tsuga* occur within the area.

Until more material is available, the name *somniaria* should be applied to the northwestern variety of *fiscellaria* on *Quercus*.

4. LAMBDINA FISCELLARIA LUGUBROSA (Hulst)

Therina lugubrosa HULST, Can. Ent., vol. 32, p. 106, 1900; U. S. Nat. Mus. Bull. 52, p. 335, 1903.

Ellopiia fiscellaria lugubrosa (Hulst) BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4654, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part I, Macrolepidoptera), No. 5146, 1938.

Male.—Color and maculation somewhat variable, ranging from a rather dull ochereous, heavily sprinkled with fuscous, to a dark, suffused, smoky fuscous, with a few sparsely scattered ochereous irroration; occasionally with the area between the transverse lines of the fore wing darker, more strongly suffused, and with a similar suffusion of the hind wing extending from the transverse line basally. The ochereous borders of the transverse lines are variable in intensity.

Alar expanse, 32–38 mm.

Genitalia like those of typical *fiscellaria*.

Female.—Similar to male in color and markings.

Alar expanse, 30–39 mm.

Genitalia as in typical *fiscellaria*.

Type.—In Rutgers College collection.

Type locality.—Rossland, British Columbia.

Food plants.—*Abies*, *Tsuga*.

Distribution.—UNITED STATES: *Idaho* (Sept.), *Maine* (Sept.), *Michigan* (Sept.), *Montana*, *Washington* (Sept., Oct.), *Wisconsin* (July, Sept.). CANADA: *British Columbia* (Sept.), *Nova Scotia* (Sept.).

Fifty-four specimens examined.

Remarks.—Examples of *lugubrosa* exhibit less uniformity than *somniaria* but more than typical *fiscellaria*. Its range of distribution and the variety of material on which it feeds are greater than those of *somniaria* but less than those of *fiscellaria*.

J. J. de Gryse⁴ studied larvae of *somnularia* from Vancouver Island, British Columbia, and compared them with larvae of the "Eastern Hemlock Looper" from the Muskoka Lakes region in the Province of Ontario. He noted slight differences in the mandibular structure but stated that owing to the scarcity of material the constancy of the differences could not be adequately checked. I have made numerous dissections of the specimens available, examining the parts in situ and mounted on slides. The mandibles not only exhibit considerable variation individually, but also vary in the different instars. No differences were observed that persisted with sufficient constancy to enable accurate separation of the various forms.

For the present the name *lugubrosa* should be applied to the northern and rather dark, heavily dusted with fuscous, variety of *fiscellaria* on *Abies* and *Tsuga*.

5. LAMBDA FISCELLARIA PULTARIA (Guenée)

Ellopiia pullaria GUENÉE, Histoire naturelle des insectes lépidoptères, vol. 9, p. 131, 1857.—BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4556, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part I, Macrolepidoptera), No. 5150, 1938.

Ellopiia scitata WALKER, List of the lepidopterous insects in the collection of the British Museum, vol. 26, p. 1510, 1862.

Ellopiia invexata WALKER, List of the lepidopterous insects in the collection of the British Museum, vol. 26, p. 1512, 1862.

Therina fiscellaria (Guenée) DYAR, Psyche, vol. 10, p. 13, 1903.

Male.—Pale ochereous, fresh specimens with a slight testaceous tinge; surface of the wings smooth, sheeny, with the dusting of pale fuscous scales weak or obsolete; transverse lines evenly curved, less sinuate than usually present in typical *fiscellaria*.

Alar expanse 35–40 mm.

Genitalia like those of typical *fiscellaria*.

Female.—Similar to the male in color and markings.

Alar expanse, 30–38 mm.

Genitalia like those of typical *fiscellaria*.

Types.—In United States National Museum (*pultaria*, No. 55722); British Museum (*scitata*, *invexata*).

Type localities.—"Amérique Septentrionale" (*pultaria*); east Florida (*scitata*); no locality given for *invexata*.

Food plant.—*Quercus*.

Distribution.—UNITED STATES: Florida (Apr., May).

Twenty-nine specimens examined.

Remarks.—The series is rather uniform in color and habitus, and for reasons similar to those regarding the retention of names to desig-

⁴ Scientific Agriculture, vol. 14, No. 10, 1934.

nate other varieties, *pultaria* is retained for the southern oak-feeding race of *fiscellaria*. The prevailing oak of its habitat is *Quercus virginiana*.

6. LAMBDINA FISCELLARIA LAETA (Hulst)

Therina laeta HULST, Can. Ent., vol. 32, p. 107, 1900; U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Ellopiia flavilinearia BARNES and McDUNNOUGH, Contr. Nat. Hist. Lepid. North Amer., vol. 2, No. 3, p. 131, 1913.

Ellopiia laeta (Hulst), BARNES and McDUNNOUGH, Contr. Nat. Hist. Lepid. North Amer., vol. 3, No. 3, p. 186, 1916; Check list of the Lepidoptera of Boreal America, No. 4649, 1917.—MCDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5140, 1938.

Male.—Pale to dark ochereous, resembling *pultaria* but with the transverse lines a trifle straighter and usually with the wings more heavily dusted with fuscous.

Alar expanse, 27–35 mm.

Genitalia like those of typical *fiscellaria*.

Female.—Similar to the male in color and markings.

Alar expanse, 32–38 mm.

Genitalia like those of typical *fiscellaria*.

Types.—In Rutgers College collection (*laeta*); United States National Museum (*flavilinearia*, No. 55723).

Type localities.—New Mexico (*laeta*); Palmerlee, Ariz. (*flavilinearia*).

Food plant.—Unknown.

Distribution.—UNITED STATES: Arizona (Mar., Apr., May, July, Aug.), New Mexico (Aug.).

Forty specimens examined.

Remarks.—This is probably an oak-feeding form, variable in size but rather uniform in color and maculation. For reasons previously discussed regarding varieties of *fiscellaria*, the name is retained for the southwestern race of *fiscellaria*. The prevailing oak is *Quercus utahensis*.

7. LAMBDINA CALIDARIA (Dyar)

PLATE 8, FIGURE 25, 25A

Therina calidaria DYAR, Proc. U. S. Nat. Mus., vol. 42, p. 88, 1912.

Male.—Unknown.

Female.—Cinereous, with a pale brownish-ochereous tinge and rather heavily sprinkled with pale fuscous. Transverse lines testaceous, evenly curved, not strongly sinuate, continuous between the veins; the lines with conspicuous ochereous borders.

Alar expanse, 35–40 mm.

Female genitalia (fig. 25) similar to those of typical *fiscellaria*; the internal band of ductus bursae somewhat more extenuated posteriorly. It is doubtful if this difference will prove to be constant in a large series.

Type.—U.S.N.M. No. 14245.

Type locality.—Zacualpan, Mexico.

Food plants.—Unknown.

Distribution.—MEXICO: Zacualpan (Aug.).

Five specimens examined.

Remarks.—The examples of this species closely resemble those of the preceding one, *lacta*, and also those of *axion*, which is treated next. If the specimens of *axion* are correctly identified, as seems to be the case, eventually *calidaria* and *axion* may prove to be the Lower Sonoran and Tropical representatives of a single species, or an extreme southern race of *fiscellaria*. Until there is more information and material from the intervening areas of distribution, it seems desirable to treat them as specifically distinct from *fiscellaria*.

8. LAMBDINA AXION (Druce)

PLATE 4, FIGURES 10, 10A; PLATE 8, FIGURE 23

Therina axion DRUCE, in *Biologia Centrali-Americana*, Insecta, Lepidoptera-Heterocera, vol. 2, p. 50, 1892; vol. 3, tab. 45, figs. 25-26, 1881-1900.

Male.—Brownish ocherous, heavily sprinkled with fuscous; transverse lines fuscous, evenly curved, rather weak, chiefly indicated by dark marks on the veins; the lines with conspicuous ocherous borders.

Alar expanse, 27 mm.

Genitalia (figs. 10, 10A) similar to those of typical *fiscellaria*; aedeagus without an extenuated tip distally; strongly extenuated posteriorly (differences that may not be constant in large series).

Female.—Similar to the male in color and markings.

Alar expanse, 30-35 mm.

Genitalia (fig. 23) with the ductus bursae long and narrow, at least three times the length of posterior internal band (a doubtful character which may not hold through a long series).

Type.—In British Museum.

Type locality.—Amula, Guerrero, Mexico (6,000 feet).

Food plant.—Unknown.

Distribution.—GUATEMALA: Guatemala City (July). MEXICO: Hidalgo, Orizaba, Zacualpan (Oct.). (Also recorded by Druce from Las Mercedes, Guatemala, and Volcan de Chiriquí, Panama.)

Five specimens examined.

Remarks.—The specimens studied are in the National Museum collection identified as *axion*, presumably by Dyar or Schaus; examina-

tion of the type will be necessary to verify the correctness of the determination and properly evaluate the name.

9. LAMBDA ATHASARIA ATHASARIA (Walker)

PLATE 3, FIGURES 8, 8A, 8B, 8C; PLATE 8, FIGURES 22, 22A

Ellopiia athasaria WALKER. List of lepidopterous insects in the collection of the British Museum, vol. 20, p. 163, 1869.—BARNES and McDUNNOUGH. Check list of the Lepidoptera of Boreal America, No. 4652, 1917.—HOUSER, Journ. Econ. Ent., vol. 20, pp. 299-301, 1927.—McDUNNOUGH. Check list of the Lepidoptera of Canada and United States of America (Part 1, Macrolepidoptera), No. 5143, 1938.

Ellopiia aequalitaria WALKER. List of the lepidopterous insects in the collection of the British Museum, vol. 20, p. 164, 1869.

Ellopiia seminudata WALKER. List of the lepidopterous insects in the collection of the British Museum, vol. 26, p. 1508, 1862.

Ellopiia siccaria WALKER. List of the lepidopterous insects in the collection of the British Museum, suppl. 5, p. 1547, 1866.

Ellopiia bibularia GROTE and ROBINSON, Ann. Lye. Nat. Hist. New York, vol. 8, p. 455, 1867.

Therina semiundaria PACKARD. Rep. U. S. Geol. Surv. Terr., vol. 10, p. 495, 1876 [emendation for *seminudata* (Walker)].

Therina athasaria (Walker) DYAR, Psyche, vol. 9, p. 10, 1900.—HULST, U. S. Nat. Mus. Bull. 52, p. 334, 1903 [misspelling of *athasaria* (Walker)].

Male.—Cinereous, with a slight testaceous tinge; wings heavily sprinkled with pale fuscous scales; transverse lines diffuse, not sharply defined, occasionally more strongly indicated on the veins by dots; lines evenly curved, not strongly sinuate. Wings thin, often semihyaline. Fore wing with the outer margin evenly curved or but slightly angled at vein 4. Hind wing with the outer margin evenly rounded or rarely slightly produced at vein 4.

Alar expanse, 28-38 mm.

Genitalia (figs. 8, 8A, 8B, 8C) similar to those of *fiscellaria*.

Female.—Similar to the male in color and markings.

Alar expanse, 30-37 mm.

Genitalia (figs. 22, 22A) similar to those of *fiscellaria*.

Types.—In British Museum (*athasaria*, *aequalitaria*, *seminudata*, *siccaria*); Academy of Natural Science of Philadelphia (*bibularia*).

Type localities.—New York (*athasaria*); Canada (*aequalitaria*); Orilla (West Canada) (*seminudata*); North America (*siccaria*); "Atlantic District (Penna.!) (*bibularia*).

Food plants.—*Quercus*⁵, *Tsuga*.

Distribution.—UNITED STATES: District of Columbia (Apr., May, July), Illinois (July), Massachusetts (May, Dec.), Missouri (June), New Hampshire (June), New Jersey (May), New York (May, June), Ohio (Sept.), Pennsylvania (Apr., May, June), Wisconsin.

Ninety-nine specimens examined.

⁵ Dyar, Psyche, vol. 9, p. 10, 1900.

⁶ Reared material, issued in laboratory, Irving State Forest, Mass.

Remarks.—Resembling typical *fiscellaria*, especially the pale forms, which are probably *Quercus* feeders; and without differences in genital structure of sufficient constancy for accurate separation. However, in view of differences in biology and rather constant habitus *athasaria* is regarded as a distinct species. The transverse lines of *fiscellaria* are usually more clearly defined and more sinuate than those of *athasaria* which usually has the lines evenly curved and diffuse, often accentuated on the veins. *L. fiscellaria* passes the winter in the egg stage and *athasaria* in the pupal stage.

As with *fiscellaria*, several names are retained to designate sub-specific segregates and typical *athasaria* is restricted to the eastern oak and hemlock-feeding variety.

10. LAMBDA ATHASARIA PELLUCIDARIA (Grote and Robinson)

Ellopiella pellucidaria GROTE and ROBINSON, ANN. LYN. NAT. HIST. NEW YORK, vol. 8, p. 456, 1867.—BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4651, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5142, 1938.

Therina pellucidaria (Grote and Robinson) DYAR, Psyche, vol. 9, p. 21, 1900.—HULST, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Male.—Closely resembling typical *athasaria*, somewhat darker smoky fuscous with the upper surface of the wings appearing rather smooth and uniform with the irrorations weak or obsolete.

Alar expanse, 29–40 mm.

Genitalia like those of typical *athasaria*.

Female.—Similar to the male in color and markings.

Alar expanse, 28–38 mm.

Genitalia like those of typical *athasaria*.

Type.—In Academy of Natural Sciences of Philadelphia.

Type locality.—"Atlantic District (Penn.!)"

Food plants.—*Pinus*.

Distribution.—UNITED STATES: *Arkansas*, *Florida*, *Georgia* (Apr.); *Maryland* (Mar.), *Massachusetts* (May, June), *New Jersey* (May); *New York* (June), *North Carolina* (Apr.), *Ohio* (June), *Rhode Island*, *Virginia*, *Washington Territory* (possibly mislabeled; one specimen from the Edward Graef collection).

Eighty-eight specimens examined.

Remarks.—The name should be restricted to the eastern pine-feeding variety.

11. LAMBDA ATHASARIA VITRARIA (Grote)

Ellopiella vitraria GROTE, Trans., Kansas Acad. Sci., vol. 8, p. 51, 1882.—BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No.

4647, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5136, 1938.
Therina vitraria (Grote) HULST, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Male.—Pale ochereous, with a light sprinkling of fuscous scales on the wings. Transverse lines on fore wing evenly curved, often weak or obsolete between the veins, usually more strongly accentuated on the veins. Transverse line of hind wing often continuous.

Alar expanse, 30–35 mm.

Genitalia similar to those of typical *athasaria*.

Female.—Similar to the male in color and markings.

Alar expanse, 27–35 mm.

Genitalia similar to those of typical *athasaria*.

Type.—U.S.N.M. No. 34295.

Type locality.—New Mexico.

Food plant.—Unknown (probably *Quercus*).

Distribution.—UNITED STATES: *Colorado* (June, July), *New Mexico* (July, Aug.).

Nineteen specimens examined.

Remarks.—Specimens of *vitraria* resemble typical *athasaria* in habitus but with the average size smaller, irrorations weaker, general color somewhat more ochereous, and the transverse lines of the fore wing more obscure, usually indicated only by dots on the veins. No constant structural differences were observed. The name should be applied to the rather small, pale ochereous southwestern race of *athasaria*.

12. LAMBDA ATHASARIA JACULARIA (Barnes and McDunnough)

Ellopija jacularia BARNES and McDUNNOUGH, Contr. Nat. Hist. Lepid. North America, vol. 3, No. 4, p. 254, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5137, 1938.

Male.—Resembles *vitraria* but is larger and a trifle darker with the sprinkling of fuscous scales heavier; transverse lines of the fore wing somewhat stronger (as in typical *athasaria*).

Alar expanse, 35–40 mm.

Genitalia similar to those of *vitraria*.

Female.—Unknown.

Type.—U.S.N.M. No. 55724.

Type locality.—Jemez Springs, N. Mex.

Food plants.—Unknown (probably *Quercus*).

Distribution.—UNITED STATES: *New Mexico* (Apr., May).

Seven specimens examined.

Remarks.—Barnes and McDunnough noted the close relationship of *jacularia* and *vitraria* but stated that the genitalia differed, the

spined area (cornuti) of the penis being absent and the furca shorter and broader in *vittraria* than in *jacularia*. Their conclusions were based on the genitalia of one dissected specimen, a paratype of *jacularia*. The genitalia of the type have the furca longer and slenderer than the paratype, and there is a patch of cornuti on the penis (these are deciduous in every species of the group). Aside from the fact that the specimens and genitalia of *jacularia* are slightly larger than those of *vittraria* there are no essential differences.

The close similarity of *jacularia* and *vittraria*, their collection dates (*jacularia*, Apr., May; *vittraria*, June, July, Aug.), and their distribution (*jacularia*, New Mexico; *vittraria*, Colorado, New Mexico) suggest that they may be earlier and later generations of the same form. Until this is verified by future rearings, it is believed advisable to treat them separately and to use the name *jacularia* for the larger, darker ocherous, rather heavily dusted fuscous, southwestern race of *athasaria*.

13. LAMBDINA NEGATA (Dyar)

PLATE 3, FIGURES 9, 9A; PLATE 8, FIGURE 24

Therina negata DYAR, Insecutor Inscitiae Menstruus, vol. 6, p. 136, 1918.

Male.—Dull brownish ocherous, with a slight testaceous tinge; heavily sprinkled with pale fuscous scales; transverse lines evenly curved, obsolete between the veins and chiefly indicated by fuscous dots on the veins, occasionally with faint ocherous borders.

Alar expanse, 33 mm.

Genitalia (figs. 9, 9A) similar to those of *athasaria*, except aedeagus not conspicuously extenuated posteriorly and the distal plate only slightly produced (probably an individual rather than a specific character).

Female.—Similar to the male in color and markings.

Alar expanse, 35 mm.

Genitalia (fig. 24) similar to those of *athasaria*, but internal band of the ductus bursae not extenuated posteriorly (perhaps an individual rather than specific difference).

Type.—U.S.N.M. No. 21739.

Type locality.—Zacualpan, Mexico.

Food plants.—Unknown.

Distribution.—MEXICO: Orizaba, Zacualpan (Oct.).

Two specimens examined.

Remarks.—Closely resembles, and scarcely separable from, the less distinctly marked examples of *jacularia*. A larger series will be necessary to determine the distinctness or synonymy of the two forms; *negata* may represent only a Mexican race of *athasaria*.

14. *LAMBDA PUNCTATA PUNCTATA* (Hulst)

PLATE 4, FIGURES 11, 11A, 11B, 11C; PLATE 9, FIGURE 26

Therina punctata HULST, Can. Ent., vol. 30, p. 215, 1900; U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Ellopiia punctata (Hulst) BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4648, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5138, 1938.

Male.—Cinereous, with a brownish-ocherous tinge, often with a conspicuous sprinkling of fuscous scales. Transverse lines dark, sinuate, occasionally accentuated on the veins by dots; pale, specimens with the transverse lines faint or absent.

Alar expanse, 25–37 mm.

Genitalia (figs. 11, 11A, 11B, 11C): Gnathos narrow; anellus short; furca short, not compressed; penis without cornuti.

Female.—Similar to the male in color and markings.

Alar expanse, 24–38 mm.

Genitalia (fig. 26): Ventral operculum only partially sclerotized or sclerotization absent; sclerotization along ventral margin of the genital opening incomplete (central portion not sclerotized); posterior internal band of ductus bursae not heavily sclerotized; bursa copulatrix elongate; signum ovate with margin serrate.

Type.—In Rutgers College collection.

Type locality.—Glenwood Springs, Colo.

Food plant.—*Quercus*.

Distribution.—UNITED STATES: Arizona (June, July, Sept.), Colorado (Aug., Sept., Oct.), New Mexico (Sept.), Utah (Aug., Sept.).

Eighty-one specimens examined.

Remarks.—Superficially this species closely resembles *vittraria*, but it has the transverse posterior line more sinuate. The genitalia of the two forms are distinct. The males of *punctata* are easily recognized by the narrow gnathos, the short anellus, and the short stubby furca, and the females by the absence of or partial sclerotization of the ventral operculum, the incomplete sclerotization along ventral margin of the genital opening, and the smaller, less concave signum.

15. *LAMBDA PUNCTATA PHANTOMA* (Barnes and McDunnough)

Ellopiia (Therina) phantoma BARNES and McDUNNOUGH, Contr. Nat. Hist. Lepid. North America, vol. 3, No. 1, p. 31, 1916.

Ellopiia phantoma BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4648, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5139, 1938.

Male.—Pale cinereous, with a slight ocherous tinge; wings with a light sprinkling of pale fuscous scales, more intense on the fore wing; transverse lines of fore wing dark, sinuate, and continuous, transverse line of hind wing less distinct.

Alar expanse, 27–31 mm.

Genitalia like those of typical *punctata*.

Female.—Similar to the male in color and markings.

Alar expanse, 27–31 mm.

Genitalia like those of typical *punctata*.

Type.—U. S. N. M. No. 55725.

Type locality.—White Mountains, Ariz.

Food plant.—*Quercus*.

Distribution.—UNITED STATES: *Arizona* (June, July).

Eighteen specimens examined.

Remarks.—The examples of *phantoma* differ only slightly from those of *punctata*. They average a trifle paler, more ocherous, and with the transverse lines usually more distinct than in typical *punctata* but are scarcely distinguishable from obscurely marked examples. I believe that *phantoma* represents nothing more than a local alpine race of *punctata* in northern Arizona and should be regarded as such for the present.

BESMA, new genus

Genotype.—*Metanema quercivoraria* Guenée.

In addition to characters noted for the group: Apex of male antenna simple. Fore wing broad, with three transverse lines. Hind wing with two transverse lines, the outer rather strongly curved outward. Male genitalia with the spines of gnathos numerous, short and very fine or long and slender; furca with the spines more numerous toward distal end. Female genitalia with ventral margin of genital opening bordered by sclerotized band, the band not strongly concave; signum a broad stellate plate, with spinules on its central area.

Remarks.—Members of this genus are easily recognized by the presence of an additional transverse line (the subterminal) on the fore and hind wings. The subterminal lines are often more distinct on the under side of the wings.

The following keys are offered as an aid to identification of the species and reservations made for the keys of *Lambdina* also apply here.

KEY TO THE SPECIES OF BESMA

Males

- | | |
|--|---|
| 1. American species north of Mexico..... | 2 |
| Mexican and Central American species..... | 4 |
| 2. Aedeagus with a strongly sclerotized ventrodistal bifurcation | |
| 1. <i>sesquilinearia</i> (Grote) | |
| Aedeagus without such sclerotized ventrodistal bifurcation..... | 3 |

3. Color pale testaceous, with a slight pinkish tinge, without conspicuous ocherous patches-----4. *rubritincta* (Cassino and Swett)
 Coloration not as above-----5. *quercivoraria* (Guenée)
4. Aedeagus with a strongly sclerotized ventrodistal bifurcation
 3. *marilacta* (Dyar)
 Aedeagus without such ventrodistal bifurcation----- 5
5. Gnathos broad; furca rather abruptly enlarged distally
 8. *mattearia* (Schaus)
 Gnathos narrower; furca not abruptly enlarged distally-----7. *brea* (Druce)

Females

1. American species north of Mexico----- 2
 Mexican and Central American species----- 4
2. Color pale testaceous, with a slight pinkish tinge, without conspicuous ocherous patches-----4. *rubritincta* (Cassino and Swett)
 Coloration not as above----- 3
3. Ventral margin of genital opening bordered by a rather broad, strongly sclerotized band with even anterior margin; ventral operculum strongly sclerotized-----5. *quercivoraria* (Guenée)
 Ventral margin of genital opening bordered by a rather narrow, crinkled, moderately sclerotized band, anterior margin uneven
 1. *sesquilinearia* (Grote)
4. Ventral margin of genital opening bordered by a rather broad, strongly sclerotized band with even anterior margin----- 5
 Ventral margin of genital opening bordered by a rather narrow, crinkled, moderately sclerotized band, anterior margin uneven
 3. *marilacta* (Dyar)
5. Sclerotization of ductus bursae extensive, usually extending from genital opening to junction of ductus bursae with bursa
 8. *mattearia* (Schaus)
 Sclerotization of ductus bursae much less extensive, usually less than one-half length of ductus-----7. *brea* (Druce)

1. *BESMA SESQUILINEARIA* (Grote)

PLATE 6, FIGURES 16, 16A; PLATE 9, FIGURE 30

Endropia sesquilinearia GROTE, Can. Ent., vol. 15, p. 125, 1883.

Euchlaena sesquilincaria (Grote) HULST, U. S. Nat. Mus. Bull. 52, p. 341, 1903.—
 BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4694, 1917.

Destutia sesquilincaria (Grote) McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5121, 1938.

Male.—Pale brownish ocherous, wings rather densely sprinkled with pale fuscous. Fore wing angulate; transverse anterior and posterior lines testaceous, nearly straight or evenly curved. Hind wing with outer margin rounded or but slightly produced at vein 4; transverse line evenly curved, appearing as a continuation of the posterior transverse line of fore wing.

Alar expanse, 42–45 mm.

Genitalia (figs. 16, 16A): Uncus rather short and stout, strongly dilated basally; gnathos well developed, broad and with many very fine spinules; costa of harpe straight or slightly convex; furca extending to or beyond costa of harpe; distal dilation slight and gradual; aedeagus with a strongly sclerotized asymmetrical ventrodistal bifurcation (fig. 16A), also armed distally with a strongly sclerotized and extenuated plate which is conspicuously broadened basally and scobinate along its margin; penis with a large patch of cornuti.

Female.—Similar to the male in color and markings.

Alar expanse, 37–45 mm.

Genitalia (fig. 30): Ventral operculum moderately sclerotized; sclerotized band bordering ventral margin of genital opening narrow, crinkled, anterior margin uneven; signum a disklike plate with long spinelike teeth.

Type.—U.S.N.M. No. 55726.

Type locality.—Arizona.

Food plant.—Unknown.

Distribution.—UNITED STATES: Arizona, Cochise County (Mar., May, June, July, Aug.), White Mountains near Rice (July).

Thirty-eight specimens examined.

Remarks.—The examples representing this species taken early in the season (May) are more densely sprinkled with fuscous and noticeably larger (43–45 mm. wing expanse) than those taken later (June, July, Aug. Sept., expanse 32–38 mm.).

2. BESMA SESQUILINEARIA CAVILLARIA (Hulst)

Tetractis cavillaria HULST, Ent. Amer., vol. 1, p. 203, 1886.

Metanema ♀ *novellata* HULST, Ent. Amer., vol. 1, p. 204, 1886.

Therina cavillaria (Hulst) HULST, U. S. Nat. Mus. Bull. 52, p. 335, 1903.

Sabulodes novellata (Hulst) HULST, U. S. Nat. Mus. Bull. 52, p. 346, 1903.

Euchlaena cavillaria (Hulst) BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4695, 1917.

Destutia cavillaria (Hulst) McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5122, 1938.

Male.—Similar to typical *sesquilinearia* but averaging smaller, a trifle paler, and the sprinkling of fuscous scales less intense.

Alar expanse, 33–40 mm.

Genitalia like those of typical *sesquilinearia*.

Female.—Similar to the male in color and markings.

Alar expanse, 35–40 mm.

Genitalia like those of typical *sesquilinearia*.

Types.—In Rutgers College collection (*cavillaria*); United States National Museum (*novellata*, No. 34007).

Type localities.—Arizona (*cavillaria*, *novellata*).

Food plant.—Unknown.

Distribution.—UNITED STATES: Arizona, Cochise County (July, Aug., Sept.), Gila County (July), Graham County (June).

Twenty-seven specimens examined.

Remarks.—Collection dates indicate that typical *sesquilinearia* appears in the spring and early part of summer and that *cavillaria* is in flight from midsummer until fall (the periods would naturally vary according to the season). Intergrading forms occur during June and the early part of July. Again the evidence suggests that only seasonal forms are represented by the names but until this is verified by rearings, *cavillaria* should be kept as a variety.

McDunnough⁷ noted the close similarity of *sesquilinearia* and *cavillaria* and the probability of their erroneous generic placement.

3. BESMA MARILACTA (Dyar)

PLATE 6, FIGURES 17, 17A; PLATE 10, FIGURE 35

Metanema marilacta DYAR, Proc. U. S. Nat. Mus., vol. 51, p. 27, 1916.

Male.—Pale whitish ochereous, sparsely sprinkled with testaceous. Resembles *sesquilinearia* somewhat in habitus and maculation, with the wings more angulate and the transverse lines rather obscure, not sharply defined; outer margins of the wings edged with testaceous scales.

Alar expanse, 38 mm.

Genitalia (figs. 17, 17A) somewhat similar to those of *sesquilinearia* but with harpe stouter, costa more convex and the furca abruptly enlarged distally.

Female.—Similar to the male in habitus and maculation but with the transverse lines more sharply defined and the posterior line somewhat concave inward.

Alar expanse, 38–40 mm.

Genitalia (fig. 35) similar to those of *sesquilinearia* but larger, with the narrow crinkled sclerotized band bordering ventral margin of genital opening more developed, the signum larger and more circular in form. Ventral operculum moderately sclerotized.

Type.—U.S.N.M. No. 18880.

Type locality.—Zacualpan, Mexico.

Food plant.—Unknown.

Distribution.—MEXICO: Cuernavaca (June), Zacualpan (Mar., Sept.).

Three specimens examined.

Remarks.—The series representing this species in the National Museum collection consists of one male from Zacualpan (March), the

⁷ Contr. Nat. Hist. Lepid. North Amer., vol. 3, no. 3, p. 187, 1916.

female type (Zacualpan, September), and one female from Cuernavaca (June). Differences in character of the transverse lines of the male suggest that its association with the females may not be correct. The female from Cuernavaca is very similar in color and habitus to some examples of *cacillaria*, and except for the production of the outer margin of the hind wing at vein 4 it is scarcely separable. However, until more material and information are at hand, it will not be possible to define the limit of variation in the species, and the specimens under *marilacta* had best be left in their present association.

4. *BESMA RUBRITINCTA* (Cassino and Swett) .

PLATE 5, FIGURES 14, 14A; PLATE 10, FIGURE 32

Sabulodes rubritincta CASSINO and SWETT, The Lepidopterist, vol. 4, No. 5, p. 37, 1925.

Destutia rubritincta (Cassino and Swett) McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5123, 1938.

Sabulodes rubritincta f. *nigripuncta* CASSINO and SWETT, The Lepidopterist, vol. 4, No. 5, p. 38, 1925.

Destutia rubritincta f. *nigripuncta* (Cassino and Swett) McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5123, 1938.

Male.—Pale testaceous, with a slight ochereous tinge; transverse lines of wings somewhat darker testaceous, slightly curved. Fore wing with anterior and posterior transverse lines edged inwardly and outwardly respectively with pale ochereous; transverse anterior line occasionally only faintly indicated. Hind wing similar to fore wing in color and with a transverse line appearing as a continuation of transverse posterior line of fore wing, edged outwardly with pale ochereous. The subterminal lines often indistinct on upper surface of the wings.

Alar expanse, 35–38 mm.

Genitalia (figs. 14, 14A) similar to those of *quercivoraria* but with uncus stouter and the spinules of gnathos finer.

Female.—Color of body and upper surfaces of wings similar to those of the male. Under surfaces of wings with a rather dense sprinkling of fuscous and reddish brown scales. Wings more angulate than those of the male and outer margin of hind wing crenulate.

Alar expanse, 38–40 mm.

Genitalia (fig. 32) similar to and scarcely distinguishable from those of *quercivoraria*.

Types.—In Museum of Comparative Zoology.

Type localities.—Arizona, Pima County, Baboquivari Mountains.

Food plant.—Unknown.

Distribution.—UNITED STATES: *Arizona*.

Ten specimens examined.

Remarks.—The occasional occurrence of specimens with fuscous patches of various shapes and sizes is not uncommon in many of the species of Geometridae. The name *nigripuncta* was applied by Cassino and Swett to a male form with a patch of fuscous scales on the fore wing just beyond the transverse posterior line near the inner margin; and to a female with a similar patch on hind wing near the inner margin and adjacent to transverse line in addition to the patch on the fore wing. In my opinion, *nigripuncta* represents nothing more than a color variant; and the name is therefore placed in synonymy.

5. *BESMA QUERCIVORARIA* (Guenée)

PLATE 4, FIGURES 12, 12A; PLATE 10, FIGURE 31

Metanema quercivoraria GUENÉE. Histoire naturelle des insectes lépidoptères, vol. 9, p. 172, 1857.—PACKARD, Rep. U. S. Geol. Surv. Terr., vol. 10, p. 544, 1876.—HULST, U. S. Nat. Mus. Bull. 52, p. 342, 1903.—BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4726, 1917.

Metanema aeliaria WALKER. List of the lepidopterous insects in the collection of the British Museum, vol. 20, p. 260, 1860.

Metanema trilinearia PACKARD, Rep. U. S. Geol. Surv. Terr., vol. 10, p. 542, 1876.

Endropia texlinaria GROTE and ROBINSON. Ann. Lyc. Nat. Hist. New York, vol. 8, p. 449, 1867.

Metanema incongruaria HULST, Ent. Amer., vol. 2, p. 212, 1887.

Ellopiia quercivoraria (Guenée) McDUNNOUGH. Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5145, 1938.

Male.—General color and maculation variable, ranging from a form that is uniformly pale ochereous, with the transverse lines rust-brown and rather distinct, to a form with the ochereous ground color almost obscured by a dense sprinkling of light rust-brown scales, which sometimes form irregular patches. Fore wing broad, angular, excavated between the apex and vein 4; subterminal line serrate, uneven. Hind wing produced at vein 4; subterminal line strongly curved outward.

Alar expanse, 26–38 mm.

Genitalia (figs. 12, 12A): Harpe simple, rather broad basally and narrowed apically; uncus slender; gnathos with numerous long, slender spines; anellus somewhat scobinate basally; furca with a patch of spinules at distal end; aedeagus with an augerlike sclerotized process distally, this process slightly produced and with a serrate margin; a large patch of long, slender cornuti on penis.

Female.—Several types of maculation occur: One similar to the male; a second uniform dull ochereous, sparsely to rather densely sprinkled with testaceous scales; and a third uniform dull ochereous, sprinkled with testaceous scales and with conspicuous patches of fuscous scales on the inner margin of fore wing adjacent to the

transverse posterior line. As compared with the male, the fore wing is usually more angulate, with the apex more produced and the excavation between the apex and vein 4 deeper; the hind wing has the outer margin more crenulate and more produced at vein 4, and the transverse lines of both wings straighter and more sharply defined.

Alar expanse, 34–40 mm.

Genitalia (fig. 31): Ventral operculum strongly sclerotized; ventral margin of genital opening bordered by a rather broad, straight band with smooth anterior margin; ductus bursae broad anteriorly, narrow posteriorly and with the posterior internal band strongly sclerotized; bursa copulatrix slightly scobinate near origin of ductus seminalis; signum a large ovate, slightly concave plate with slender, spine-like marginal teeth and few if any of the teeth bidentate; central area of plate with numerous spinules.

Types.⁸—In United States National Museum (*quercivoraria*, No. 55720), British Museum (*aciliaria*); location unknown (*textrinaria*, *incongruaria*).

Type localities.—"Amérique Septentrionale" (*quercivoraria*); east Florida (*aciliaria*); "Atlantic District (Penn.!) " (*textrinaria*); Hamilton, Canada (*incongruaria*).

Food plants.—*Quercus*.

Distribution.—UNITED STATES: *Arkansas* (June, July, Aug.), *Illinois* (May, June, July), *Maine*, *Massachusetts* (Sept.), *Minnesota* (June), *Missouri* (Aug.), *New York* (May), *North Carolina* (May), *Oregon* (July), *Pennsylvania* (May, June, July), *Wisconsin*. CANADA: *British Columbia* (May, June).

One hundred and thirty-six specimens examined.

Remarks.—This species is one of the most variable in color and maculation yet studied, and the variation is greater among the males than the females.

6. *BESMA QUERCIVORARIA ENDROPIARIA* (Grote and Robinson)

Ellopia endropiaria GROTE and ROBINSON, Ann. Lyc. Nat. Hist. New York, vol. 8, p. 457, 1867.—BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4653, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5144, 1938.

Therina endropiaria PACKARD, Rep. U. S. Geol. Surv. Terr., vol. 10, p. 542, 1876 (generic transfer of *Ellopia endropiaria* Grote and Robinson).

Therina endropiaria (Grote and Robinson) DYAR, Psyche, vol. 8, p. 407, 1899.—HULST, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Therina fatuaria STRECKER, Lepidoptera, Rhopaloceres and Heteroceres, indigenous and exotic, Suppl. 2, p. 8, 1899.

⁸ The name *trilinearia* occurs only in Packard's key, *quercivoraria* being substituted for it in the text.

Male.—Similar to the extremely uniform pale whitish-ocherous forms of *quercivoraria*, but with the surface of the wings appearing somewhat smoother and sheeny; sordid whitish ocherous, evenly sprinkled with cinereous irrorations.

Alar expanse, 28–32 mm.

Genitalia inseparable from those of typical *quercivoraria*.

Female.—Similar to the male in color and maculation.

Alar expanse, 30–38 mm.

Genitalia like those of typical *quercivoraria*.

Types.—In "Central Park Collection" (?)⁹ (*endropiaria*); Field Museum (*fatuaria*).

Type localities.—"Atlantic District (Penn.)" (*endropiaria*); near Montreal, Canada (*fatuaria*).

Food plants.—*Quercus*.

Distribution.—UNITED STATES: *Illinois* (May, June), *Iowa* (June), *Maine* (June), *Maryland*, *Massachusetts*, *Michigan* (Aug.), *New Jersey* (June), *New York* (May), *Pennsylvania* (May, June), *Vermont*, *Virginia* (July). CANADA: *New Brunswick* (Aug.), *Ottawa* (May, June).

Fifty-three specimens examined.

Remarks.—Hitherto *endropiaria* has been treated as a distinct species. The slighter angulation of the wings (especially those of the females) and the generally more sheeny appearance of most specimens of *endropiaria* would seem to justify such a treatment, since most examples of *endropiaria* are easily distinguished from those of typical *quercivoraria*. However, among specimens from British Columbia, Oregon, and Minnesota there are pale intermediates that intergrade with specimens of *endropiaria* and are separable only by locality labels. There are no constant structural differences in the genitalia or larvae of the two forms. In view of the easy separation of most examples the name merits retention and designates a variety of *quercivoraria* but no more than that.

7. *BESMA BREA* (Druce)

PLATE 5, FIGURES 15, 15A; PLATE 10, FIGURE 34

Metanema brea DRUCE, *Biologia Centrali-Americana*, Insecta, Lepidoptera-Heterocera, vol. 2, p. 68, 1892; vol. 3, tab. 47, fig. 26, 1881–1900.

Male.—Upper surfaces of fore and hind wings reddish brown with a metallic luster, thickly irrorated with yellow; body and under surfaces of wings paler. Fore wing with two rather straight subparallel transverse lines; anterior and posterior lines edged inwardly and outwardly respectively with gray; a black distal dot. Hind

⁹ Grote, *Can. Ent.*, vol. 14, p. 109, 1882.

wing with a large patch of yellow scales at apical angle, the patch divided by a wavy, reddish line; a medial transverse line appearing as a continuation of posterior transverse line of fore wing; outer margin crenulate, produced at vein 4.

Alar expanse, 35 mm.

Genitalia (figs. 15, 15A) resemble those of *quercivoraria* but have the harpe more robust; gnathos narrower, more produced apically; furca longer and more dilated distally; augerlike distal armature of aedeagus without an apical production.

Female.—Coloration much paler than the male. Resembles some examples of *quercivoraria* but easily separable by gray borders of transverse lines and rather large patch of ferruginous scales on outer margin of fore wing between veins 2 and 4; a much larger similar patch on hind wing extending from medial transverse line to outer margin, the ferruginous scales more dense below vein 4. Wings paler and less distinctly marked underneath than above.

Alar expanse, 36 mm.

Genitalia (fig. 34) very similar to those of *quercivoraria* but with many of the marginal teeth bidentate. Sclerotization of the ductus bursae not extensive, posterior internal band less than one-half the length of the ductus.

Type.—In British Museum.

Type locality.—Volcan de Chiriquí, 3,000 feet (Champion), Panama.

Food plant.—Unknown.

Distribution.—COSTA RICA: Juan Vinas (June).

Two specimens examined.

Remarks.—In view of the fact that considerable variation normally occurs in the genus, I am of the opinion that the material representing the species in the United States National Museum is properly determined even though the pattern of the markings is not so definite and contrasting as that shown in Druce's figure. He had but a single male specimen before him when he described the species.

8. *BESMA MATTEARIA* (Schaus)

PLATE 5, FIGURES 13, 13A; PLATE 10, FIGURE 33

Endropia mattearia SCHAU, Trans. Amer. Ent. Soc., vol. 27, p. 180, 1901.

Male.—Closely resembles *brea* but larger and with a more pronounced reddish tinge; upper surfaces of wings appearing smoother, irroration of yellow scales weaker and yellow patches not so distinct.

Alar expanse, 38 mm.

Genitalia (figs. 13, 13A) similar to those of *brea* but distinguishable by the slenderer harpe, somewhat broader gnathos, and more pronounced distal dilation of the furca.

Female.—Similar to *brea* but with upper surface of wings appearing smoother and somewhat more reddish.

Alar expanse, 33–42 mm.

Genitalia (fig. 33) similar to those of *brea* but with sclerotization of the ductus bursae extensive, extending from the genital opening to the junction of ductus bursae and bursa copulatrix.

Type.—U.S.N.M. No. 12491.

Type locality.—Jalapa, Mexico.

Food plant.—Unknown.

Distribution.—MEXICO: *Jalapa*. GUATEMALA: *Parulha*. HONDURAS: (no additional information on label).

Eleven specimens examined.

Remarks.—The distribution and close similarity of *brea* and *mat-tearia* suggest that they may represent a single variable species. With only two specimens of *brea* it is not possible to determine the constancy of the structural differences apparently distinguishing them.

EVITA, new genus

Genotype.—*Therina hyalinaria* Grossbeck.

In addition to characters noted for the group: Apex of male antenna simple. Fore wing with or without two transverse lines. Hind wing (fig. 2A) with or without a single transverse line, veins 6 and 7 stalked. Male genitalia with gnathos armed with numerous stout spines. Female genitalia with signum strongly sclerotized; without a sclerotized band bordering ventral margin of genital opening.

Remarks.—Closely resembles some species of *Lambdina* in genitalia but readily separated by the stalking of veins 6 and 7 of the hind wing.

KEY TO THE SPECIES OF EVITA

1. Fore wing pale whitish ocher, hyaline, without subterminal spot-----1. *hyalinaria* (Grossbeck)
- Fore wing dark olive-brown, with a small yellowish subterminal spot between veins 7 and 8-----3. *perpectinata* (Schaus)

1. EVITA HYALINARIA HYALINARIA (Grossbeck)

PLATE 7, FIGURES 19, 19A; PLATE 9, FIGURE 29

Therina hyalinaria GROSSECK, Proc. Ent. Soc. Washington, vol. 10, p. 88, 1908.

Ellopiia hyalinaria (Grossbeck) BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4650, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part I, Macrolepidoptera), No. 5141, 1938.

Male.—Head, labial palpus, and anterior part of thorax pale whitish ochreous; abdomen and posterior part of thorax sordid white. Wings

very thin, translucent, uniformly pale whitish, ocherous and without transverse lines, and discal or subterminal dots.

Alar expanse, 28 mm.

Genitalia (figs. 19, 19A): Harpe simple; uncus a strong hook, dilated basally; gnathos stout, with numerous coarse spines; furca not strongly compressed, length slightly less than width of harpe at base; spinules on the dorsal surface of furca essentially like those of gnathos; anellus weakly sclerotized, scobinate; penis without cornuti.

Female.—Similar to the male in color and markings.

Alar expanse, 32 mm.

Genitalia (fig. 29): Ventral operculum moderately sclerotized; ventral margin of genital opening not sclerotized; posterior internal band extending about one half the length of the ductus bursae; bursa copulatrix bulbous; signum a strongly sclerotized reniform plate with two prominent spines.

Type.—U.S.N.M. No. 11874.

Type locality.—Southern Arizona.

Food plant.—Unknown.

Distribution.—UNITED STATES: *Arizona*.

Three specimens examined.

Remarks.—Except for the somewhat duller appearance of the wings, the examples of *hyalinaria* are indistinguishable from some of those of *blandaria*, which is discussed next.

2. EVITA HYALINARIA BLANDARIA (Dyar)

Therina blandaria DYAR, Proc. U. S. Nat. Mus., vol. 51, p. 27, 1916.

Male.—Similar to *hyalinaria* in habitus. Color and maculation variable, ranging from forms that are conspicuously sprinkled with fuscous, with two (sometimes obscure) transverse lines on the fore wing, the lines slightly curved and rather diffuse and with a similar line on the hind wing appearing as a continuation of the transverse posterior of the fore wing, to forms that are a uniform pale ocherous with the wings rather clear and transparent, the surface appearing somewhat glazed and the markings obsolete.

Alar expanse, 26–31 mm.

Genitalia like those of typical *hyalinaria*.

Female.—Similar to the male in color and markings.

Alar expanse, 27 mm.

Genitalia like those of typical *hyalinaria*.

Type.—U.S.N.M. No. 18882.

Type locality.—Popocatepetl Park, Mexico.

Food plant.—Unknown.

Distribution.—MEXICO: Popocatepetl Park (June, July), Cuajimalpa.

Twenty-three specimens examined.

Remarks.—It appears from the similarity in habitus, color, maculation and genitalic structures of *blandaria* and *hyalinaria* that only one species with two varieties is involved; *hyalinaria* occurring in the arid southwestern part of the United States (also probably the adjacent northern Mexican area) and *blandaria* in the more southern and humid part of Mexico. The extremely immaculate examples of *blandaria*, with the lines obsolete, intergrade with the specimens of *hyalinaria* and are distinguishable only by the slightly more glazed appearance of the wings.

3. EVITA PERPECTINATA (Schaus)

PLATE 7, FIGURES 18, 18A

Therina ? *perpectinata* SCHAU. Ann. Mag. Nat. Hist., ser. 8, vol. 10, p. 235, 1912.

Male.—Head, labial palpus, and thorax dark smoky fuscous; fore wing dark brown, with an olivaceous tinge and metallic luster, a small yellowish spot near the apex between veins 7 and 8; hind wing paler, light smoky fuscous.

Alar expanse, 40 mm.

(Genitalia (figs. 18, 18A) : Harpe simple, uncus stout, a strong hook; gnathos with the apical process compressed, narrow with numerous coarse spines; furca with a few spines distally; penis with long slender cornuti.

Female.—Unknown.

Type.—U.S.N.M. No. 17709.

Type locality.—Ojo de Agua, Costa Rica.

Food plant.—Unknown.

Distribution.—COSTA RICA: Ojo de Agua (Oct.).

One specimen examined.

Remarks.—This species, tentatively referred to *Therina* when described by Schaus, is more closely related generically to *hyalinaria* than any species yet studied.

MISCELLANEOUS COMMENTS

Notes on the synonymy and assignment of species to other genera:

NEMATOCAMPA EXPUNCTARIA Grote

Nematocampa expunctaria GROTE, Can. Ent., vol. 4, p. 101, 1872.—PACKARD, Rep. U. S. Geol. Surv. Terr., vol. 10, p. 471, 1876 (cited as a synonym of *Nematocampa filamentaria* Guenée).

Nematocampa limbata f. *expunctaria* (Grote) BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4680, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5044, 1938.

Type.—In Academy of Natural Sciences of Philadelphia.

Type locality.—Alabama.

Remarks.—Grote, commenting¹⁰ on Packard's reference of *expunctaria* to *filamentaria* without having seen the type of *expunctaria*, expressed the belief that when the type of *expunctaria* was examined it would be found to be a different species. Recently I have had opportunity to examine Grote's type to dissect the genitalia. As compared with *filamentaria*, Grote's type (unique) differs in the following respects: Markings absent other than two transverse lines on the fore wing and a single transverse line on the hind wing; harpe with apex of ventral margin pointed, triangular-form; anellus with the lateral arms straighter and dilated below bifurcation; vinculum (ventrally) broader and less incised; aedeagus slenderer and smaller. The differences in maculation and structure of *filamentaria* and *expunctaria* substantiate Grote's contention regarding the distinctness of his species, and it should be given full specific rank.

NEMATOCAMPA BRUNNEOLINEATA (Hulst), new combination

Eugonobapta brunneolineata HULST. Journ. New York Ent. Soc., vol. 5, No. 3, p. 218, 1901.

Ellopia brunneolineata (Hulst) BARNES and McDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4658, 1917.—McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5151, 1938.

Type.—In Rutgers College collection.

Type locality.—Florida.

Remarks.—Dyar¹¹ commenting on the type of *brunneolineata* stated: "One type. I think it is a very badly rubbed specimen of *Ania limbaria* Haw., that originally had but very little purple."

On a recent visit to Rutgers I found the Hulst type to be in excellent condition, with no effects of rubbing evident. Circumstances would not permit dissection of the genitalia. Superficially *brunneolineata* is very much like *expunctaria*, and in view of the proximity of their type localities (*brunneolineata*, Florida; *expunctaria*, Alabama), similarity of color, maculation, hind tibiae, etc., the two forms will probably prove to be conspecific. Dissection of the genitalia of *brunneolineata* (also a unique) will be necessary definitely to establish their status. Pending dissection of the genitalia, superficial structures justify its removal from the group with which it has been associated and assignment to the genus *Nematocampa* Guenée.

¹⁰ Can. Ent., vol. 14, p. 110, 1882.

¹¹ Proc. Ent. Soc. Washington, vol. 6, No. 4, p. 226, 1904.

NEPYTIA NOMIA (Druce), new combination

Therina (?) *nomia* DRUCE, Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera, vol. 2, p. 51, 1892; vol. 3, tab. 46, fig. 4, 1881-1900.

Type.—In British Museum.

Type locality.—MEXICO: Jalapa and Las Vegas.

NEPYTIA MARIARIA (Schaus), new combination

Therina mariaria SCHAUUS, Insector Inscitiae Menstruus, vol. 11, p. 161, 1923.

Type.—U.S.N.M. No. 26564.

Type locality.—GUATEMALA: Volcan Santa Maria.

DESTUTIA MODICA (Schaus), new combination

Therina modica SCHAUUS, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 593, 1911.

Type.—U.S.N.M. No. 17451.

Type locality.—COSTA RICA: Juan Vinas, Sitio.

Generic reassignment of the following species is held in abeyance pending completion of the revisional study of the subfamily:

Ellopiia myandaria WALKER, List of the lepidopterous insects in the collection of the British Museum, vol. 20, p. 164, 1860.

Type.—In British Museum.

Type locality.—MEXICO: Oajaca.

Ellopiia despoliata WALKER, List of the lepidopterous insects in the collection of the British Museum, vol. 26, p. 1511, 1862.

Type.—In British Museum.

Type locality.—VENEZUELA (no further locality cited).

Therina betula DRUCE, Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera, vol. 2, p. 50, 1892; vol. 3, tab. 45, fig. 28, 1881-1900.

Type.—In British Museum.

Type locality.—GUATEMALA: Cerro Zunil, 4,000 to 5,000 feet (Champion).

Therina munda DRUCE, Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera, vol. 2, p. 50, 1892; vol. 3, tab. 45, fig. 28, 1881-1900.

Type.—In British Museum.

Type locality.—MEXICO: Amecameca.

Therina bada DRUCE, Biologia Centrali-American, Insecta, Lepidoptera-Heterocera, vol. 2, p. 51, 1892; vol. 3, tab. 46, figs. 1 and 2, 1881-1900.

Type.—In British Museum.

Type localities.—GUATEMALA: Totonicapam, 8,500 to 10,500 feet, Quiche Mountains, 7,000 to 9,000 feet (Champion).

Therina atomaria SCHAUUS, Trans. Amer. Ent. Soc., vol. 27, p. 179, 1901.

Type.—U.S.N.M. No. 12445.

Type locality.—COSTA RICA: Juan Vinas.

Therina punctillaria SCHAUUS, Trans. Amer. Ent. Soc., vol. 27, p. 179, 1901.

Type.—U.S.N.M. No. 12442.

Type locality.—MEXICO: Oaxaca.

Therina templadaria SCHAUUS, Trans. Amer. Ent. Soc., vol. 27, p. 179, 1901.

Type.—U.S.N.M. No. 12444.

Type locality.—MEXICO: Jalapa.

Therina pardiria SCHAUUS, Trans. Amer. Ent. Soc., vol. 27, p. 245, 1901.

Type.—U.S.N.M. No. 12446.

Type locality.—PANAMA: Chiriquí.

Therina coalitaria SCHAUUS, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 594, 1911.

Type.—U.S.N.M. No. 17451.

Type locality.—COSTA RICA: Mount Poas.

Ellopiia punctularia SCHAUUS, Ann. Mag. Nat. Hist., ser. 8, vol. 9, p. 424, 1912.

Type.—U.S.N.M. No. 17600.

Type locality.—COSTA RICA: Juna Vinas or Cartago.

Remarks.—Schaus' description was based on a male, and he cited Cartago as its habitat. The species is represented in the collection by two specimens, a male bearing the type label, but with a Juan Vinas locality label, and a female bearing the Cartago locality label.

Ellopiia irrorata SCHAUUS, Ann. Mag. Nat. Hist., ser. 8, vol. 9, p. 425, 1912.

Type.—U.S.N.M. No. 17601.

Type locality.—COSTA RICA: Juan Vinas.

Ellopiia rincinaria SCHAUUS, Ann. Mag. Nat. Hist., ser. 8, vol. 9, p. 425, 1912.

Type.—U.S.N.M. No. 17602.

Type locality.—COSTA RICA: Turrialba.

Ellopiia silanaria SCHAUUS, Ann. Mag. Nat. Hist., ser. 8, vol. 10, p. 235, 1912.

Type.—U.S.N.M. No. 17708.

Type locality.—COSTA RICA: Mount Poas.

Therina ? nudata DOGNIN, Ann. Ent. Soc. Belgium, vol. 44, p. 450, 1900.

Type.—U.S.N.M. No. 32658.

Type locality.—ECUADOR: Loja.

Ellopia ? ordinata DOGNIN, Ann. Ent. Soc. Belgium, vol. 47, p. 278, 1903.

Type.—U.S.N.M. No. 32741.

Type locality.—PERU (no further locality cited).

Ellopia distincta WARREN, Novitates Zoologicae, vol. 8, p. 485, 1901.

Type.—In Tring Museum.

Type locality.—PANAMA: Chirquí.

Neotherina noxiosa DOGNIN, Hétérocères nouveaux de l'Amérique du Sud, fasc. 13, p. 12, 1917.

Type.—U. S. N. M. No. 32742.

Type locality.—COLOMBIA: Paramo del Quindin (3,800 meters).

PLATES

The drawings for the plates that follow were made under the author's supervision by Mrs. Sara Hoke DeBord, of the U. S. Bureau of Entomology and Plant Quarantine. All the drawings are from ventral view (males with aedeagus removed and portion of one harpe omitted).

EXPLANATION OF SYMBOLS APPLIED TO GENITALIA

Male

- aln*, Lateral arm of anellus.
- clh*, Costal arm of harpe.
- Cn*, Cornuti.
- dvs*, Distoventral sclerotization of aedeagus.
- Fa*, Furca.
- Gn*, Gnathos.
- Hp*, Harpe.
- Si*, Soccius.
- U*, Uncus.
- Vm*, Vinculum.

Female

- Bc*, Bursa copulatrix.
- Db*, Ductus bursae.
- Ds*, Ductus seminalis.
- lm*, Lower (ventral) margin of genital opening.
- pib*, Posterior internal band of ductus bursae.
- Sm*, Signum.
- Vo*, Ventral operculum.



1-FUSCELLARIA



2-HYALINARIA



3-FASCIARIA



1A

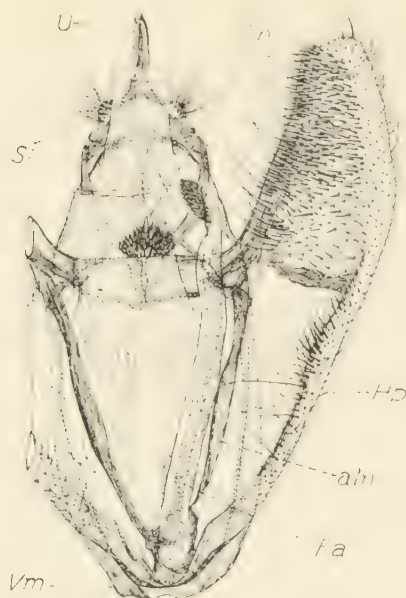


2A



3A

1-1A. *Lambdina fuscicollaria* (Guenée): Venation of fore and hind wings.
2-2A. *Evita hyalinaria* (Grossbeck): Venation of fore and hind wings.
3-3A. *Therina fasciaria* (Linnaeus): Venation of fore and hind wings.



5-INCONSPICUA



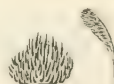
4-FASCIARIA



6-IMPERILLA



5B



5C



4A



5A

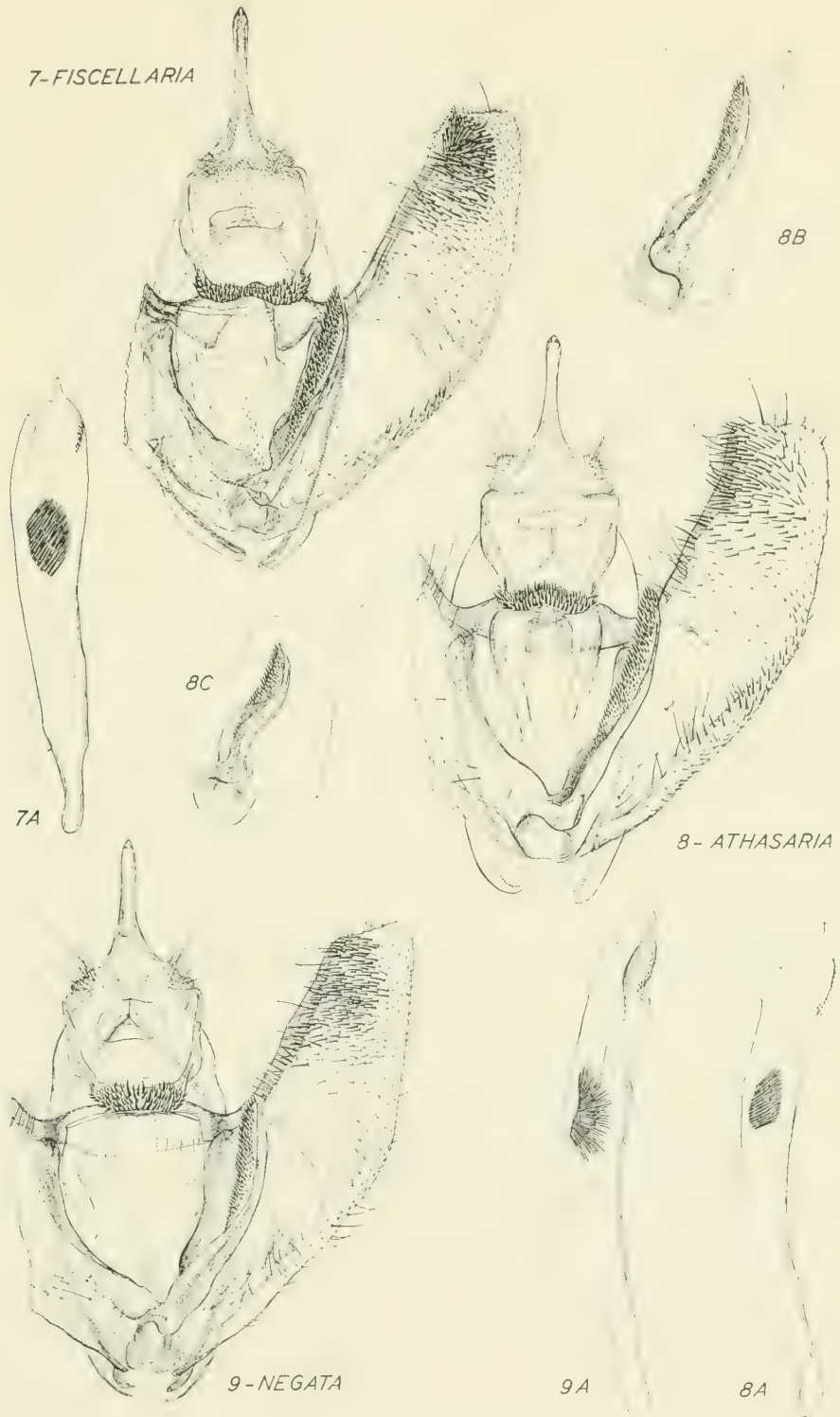


6A

4 4A. *Therina fasciaria* (Linnaeus): 4, Male genitalia; 4A, aedeagus.

5 5C. *Neotherina inconspicua* Dognin: 5, Male genitalia; 5A, aedeagus; 5B-C, variations of gnathos and furca.

6-6A. *Neotherina imperilla* Dognin): 6, Male genitalia; 6A, aedeagus.



7-7A. *Lambdina fiscellaria* (Guenée): 7, Male genitalia; 7A, aedeagus.

8-8C. *Lambdina athasaria* (Walker): 8, Male genitalia; 8A, aedeagus; 8B-C, variations of furca.

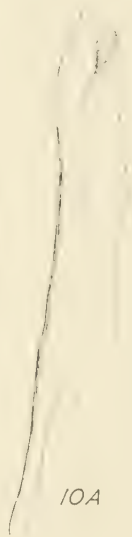
9-9A. *Lambdina negata* (Dyar): 9, Male genitalia; 9A, aedeagus.

12-*QUERCIVORARIA*

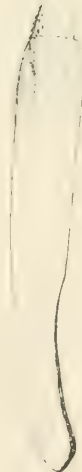
12A

10-*AXION*

11C



10A

11-*PUNCTATA*

11A

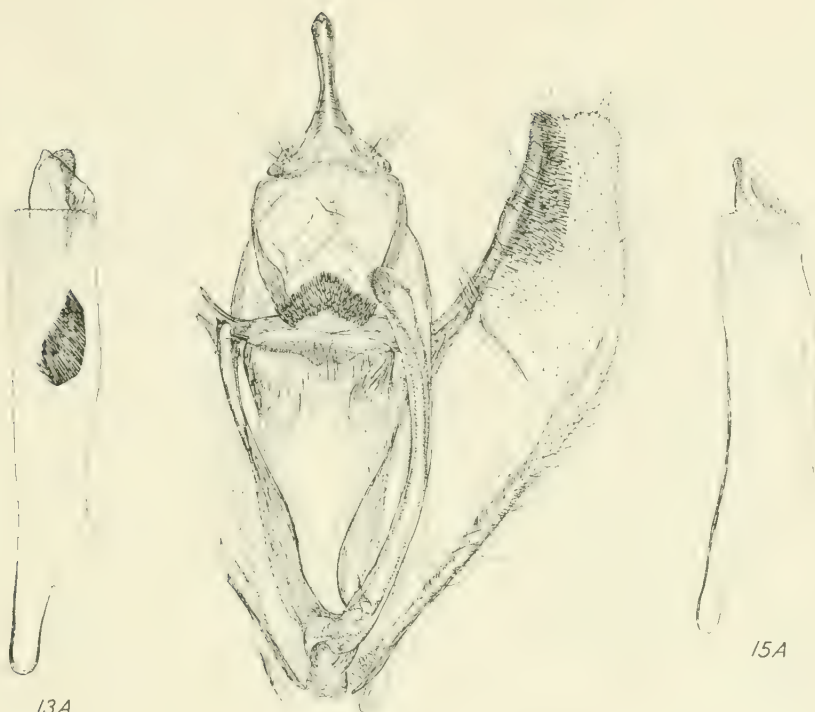


11B

10-10A. *Lambdina axion* (Druce): 10, Male genitalia; 10A, aedeagus.

11-11C. *Lambdina punctata* (Hulst): 11, Male genitalia; 11A, aedeagus; 11B-C, variations of gnathos and furca.

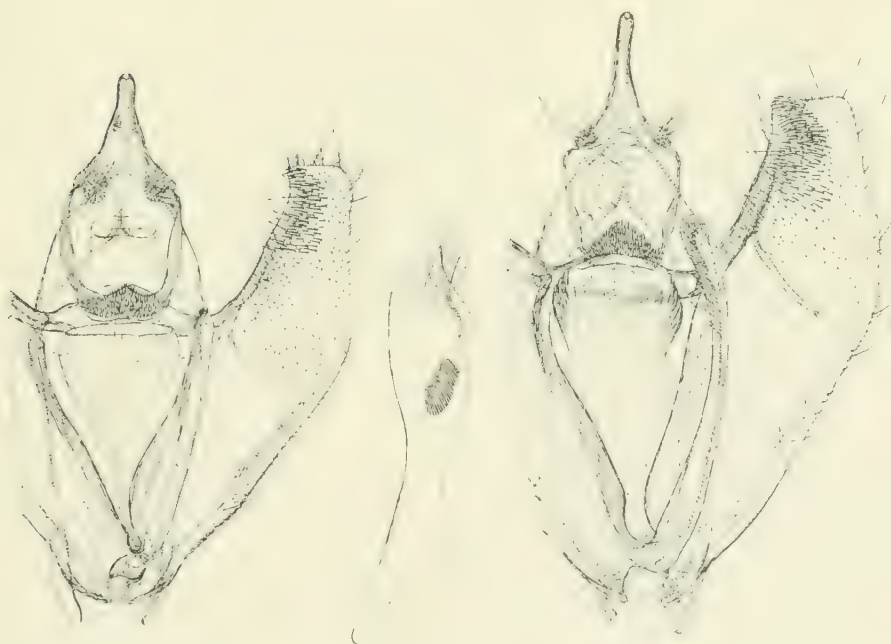
12-12A. *Lambdina quercivoraria* (Guenée): 12, Male genitalia; 12A, aedeagus.



13A

15A

13-MATTEARIA



14-RUBRITINCTA

14A

15-BREA

13-13A. *Besma mattearia* (Schaus): 13, Male genitalia; 13A, aedeagus.

14-14A. *Besma rubritincta* (Cassino and Swett): 14, Male genitalia; 14A, aedeagus.

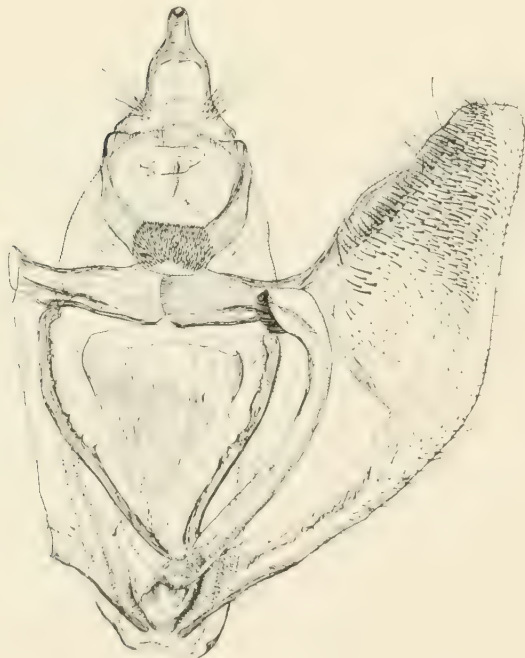
15-15A. *Besma brea* (Druce): 15, Male genitalia; 15A, aedeagus.



16-*SESQUILINEARIA*



16A



17-*MARILACTA*



17A

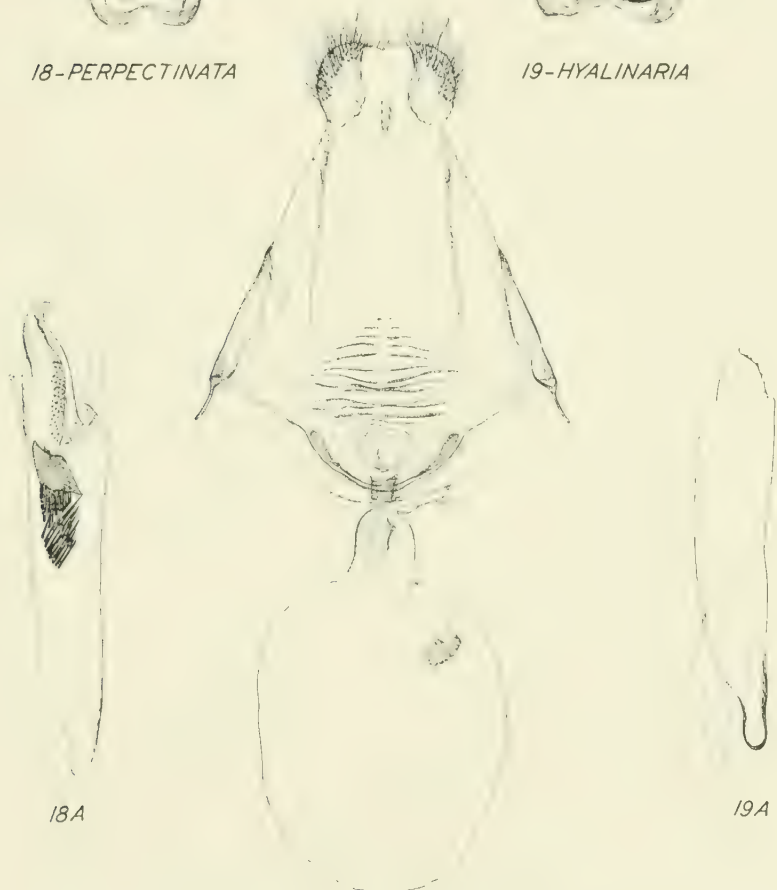
16-16A. *Besma sesquilinearia* (Grote): 16, Male genitalia; 16A, aedeagus.
 17-17A. *Besma marilacta* (Dyar): 17, Male genitalia; 17A, aedeagus.



18-PERPECTINATA



19-HYALINARIA



18A

19A

20-FASCIARIA

18-18A. *Evita perpectinata* (Schaus): 18, Male genitalia; 18A, aedeagus.

19-19A. *Evita hyalinaria* (Grossbeck): 19, Male genitalia; 19A, aedeagus.

20. *Therina fasciaria* (Linnaeus): Female genitalia.

21-FISCELLARIA

24-NEGATA

22A

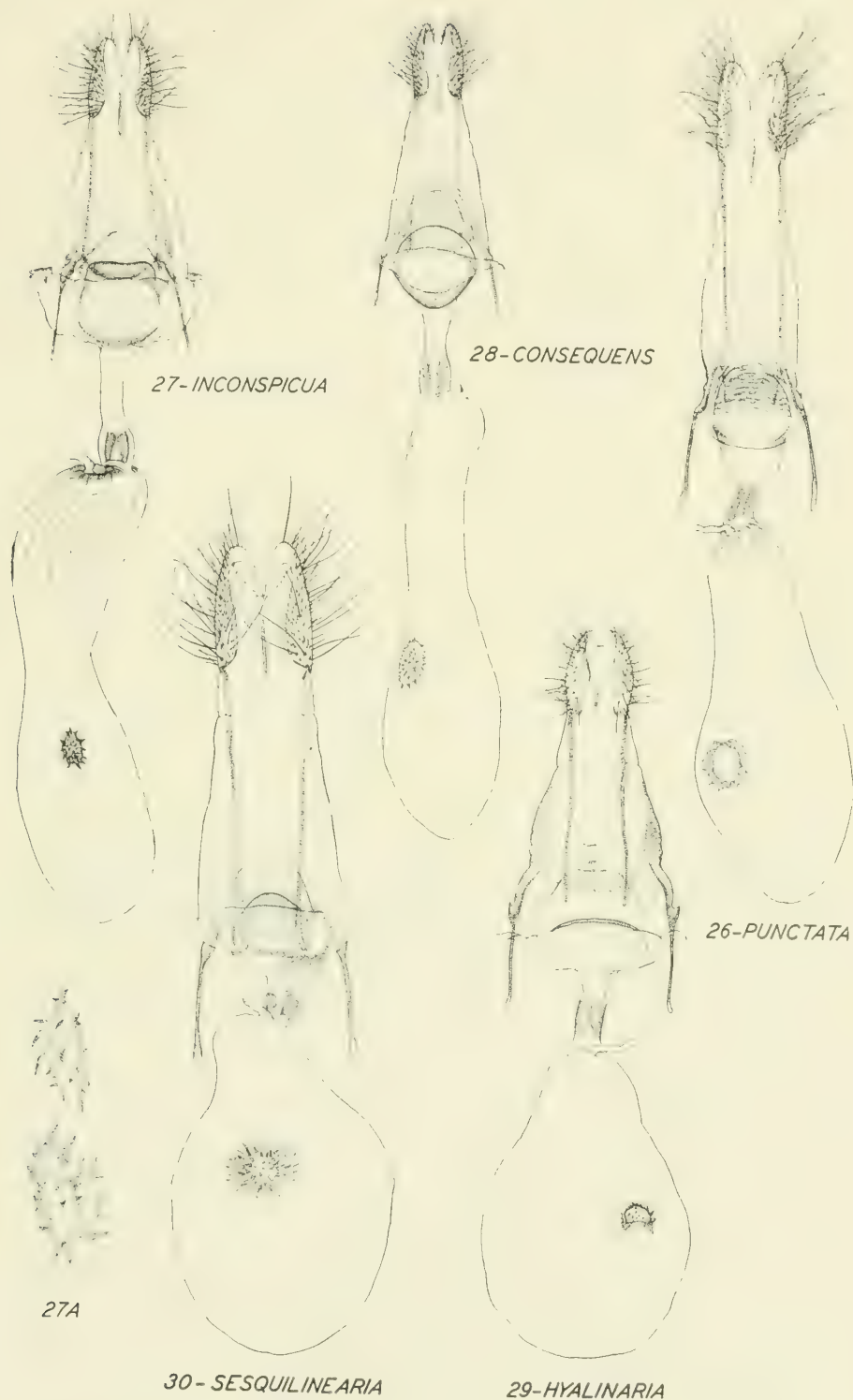
25A

22-ATHASARIA

23-AXION

25-CALIDARIA

21. *Lambdina fiscellaria* (Guenée): Female genitalia.
 22 22A. *Lambdina athasaria* (Walker): 22, Female genitalia; 22A, variations of signa.
 23. *Lambdina axion* (Druce): Female genitalia.
 24. *Lambdina negata* (Dyar): Female genitalia.
 25 25A. *Lambdina calidaria* (Dyar): 25, Female genitalia; 25A, variations of signa.



26. *Lambdina punctata* (Hulst): Female genitalia.

27-27A. *Neotherina inconspicua* Dognin: 27, Female genitalia; 27A, variations of signa (more highly magnified).

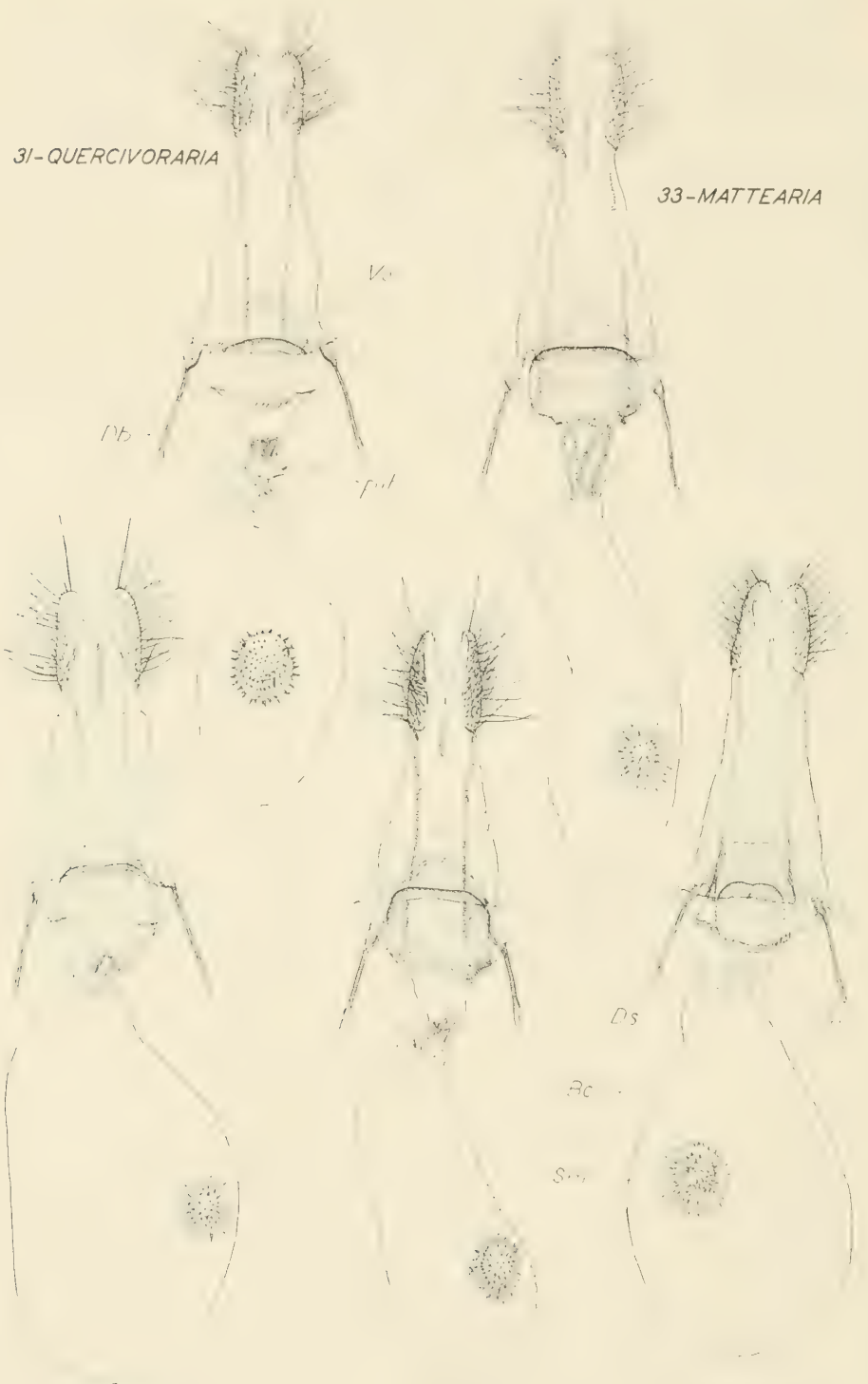
28. *Neotherina consequens* (Prout): Female genitalia.

29. *Evita hyalinaria* (Grossbeck): Female genitalia.

30. *Besma sesquilinearia* (Grote): Female genitalia.

31-*QUERCIVORARIA*

33-MATTEARIA



32-RUBRITINCTA

34-BREA

35-MARILACTA

31. *Besma quercivoraria* (Guenée): Female genitalia.
32. *Besma rubritincta* (Cassino and Swett): Female genitalia.
33. *Besma mattearia* (Schaus): Female genitalia.
34. *Besma brea* (Druce): Female genitalia.
35. *Besma marilacta* (Dyar): Female genitalia.



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SKELETAL REMAINS WITH CULTURAL ASSOCIATIONS FROM THE CHICAMA, MOCHE, AND VIRÚ VALLEYS, PERU

By T. D. STEWART

(Based partly on material and data supplied by RAFAEL LARCO HOYLE)

THE relationship of cranial type to culture in coastal Peru is just beginning to be examined. Hrdlička (1911, 1914) maintained, as did earlier writers, that the basic natural type of the whole coast was brachycranial. He concluded, also, on the basis of certain ceramic associations, that at least in the Chicama Valley this original round-headed type had been supplanted largely by one that was long-headed. Subsequently, however, Kroeber (1926b, 1930) identified the ceramics on which Hrdlička's conclusion was based as being Early instead of Late and hence decided that the earliest type was long-headed. Moreover, Kroeber believes that this long-headed form did not change in the Chinu area from Early to Late times. Elsewhere along the coast almost nothing is known about the changes that may have taken place in the natural skull shapes. The chief reason for the lack of such information in a region where crania are so plentiful is the fact that most of the coastal crania are deformed.

In the matter of the relationship of deformity type to culture we have more information, owing chiefly to Professor Kroeber's accurate observations. These observations pertain mainly to four parts of the coast: (1) The region of Trujillo on the north coast, (2) about Lima on the central coast, (3) the Cañete Valley south of Lima, and (4) the region of Nazca on the southern coast. Taking these four areas in the order enumerated, we may briefly summarize Kroeber's findings:

Around Trujillo the long-headed and undeformed type of the Early Chimu people, according to Kroeber (1926b, 1930), was followed by a fronto-occipitally deformed type in the Middle period and in Late Chimu times by one often exhibiting simple occipital deformity. The variety of fronto-occipital deformity characteristic of this part of the coast has been classified by Imbelloni (1933) as "tabular erecta," that is, with the occipital flattening vertically directed. Examples are shown in plates 11 and 12.

In the Lima region the skulls of the Proto-Lima people, probably slightly earlier in time than the Early Chimu of the north coast, are said by Kroeber (1926a) to be undeformed. On the other hand, the skulls of the Sub-Chancay people, a population in a later cultural phase, show occipital flattening alone in the majority of cases. It is noteworthy, too, that burial position correlates with this subdivision: The Proto-Lima skeletons are found extended, whereas the Sub-Chancay skeletons are flexed.

In the Cañete Valley, where Kroeber (1937) found Middle and Late period burials, the skulls from the Middle period were the more extremely deformed. In this case the pressure had been applied both high on the forehead and on the occiput in such a way as to broaden and lower the height of the vault. Some of the Late skulls are said to have simple occipital flattening.

From Cañete south into the Nazca area Kroeber (1926a) has called attention to the constant association of heavy frontal deformation with the Sub-Nazca culture and of light simple occipital deformation with the late Chinca culture. Examples of extreme deformity types from the south coast are shown in plates 13 and 14. The details of these types, which have not been analyzed clearly as yet, seem to vary from site to site or valley to valley. However, their correlation with the several cultural phases is an established fact. As Kroeber (1930, p. 71) remarks, "deformation, when its type and distributions have been worked out, promises to be an important and convenient criterion to culture classification because of the ease with which cranial material usually is obtainable."

In addition to these general correlations between cranial or deformity type and culture, as just outlined, a few measurements on culturally identified skulls also have been published. For these data we must acknowledge indebtedness again to Professor Kroeber. As these measurements stand now, however, they are very little more useful than those on earlier series identified only as to site. The reason for this low valuation is the fact that these identified specimens are small in number and most of them are deformed. There are, in fact, data on only two small series: One from the Chicama-Moche-Virú region (Kroeber, 1930), consisting of 49 adults (8 Early, 6 Middle, and 35 Late), and the other from the Cañete

Valley, consisting of 34 unsexed adults (23 Middle, 11 Late). For both series the measurements are limited to the three diameters of the vault and the effect of deformity is not indicated.

In following the progress of Professor Kroeber's studies I have searched vainly through the large collections from coastal Peru in our National Museum for culturally identified specimens. For the most part the skulls are not labeled as to exact site. And even when the site is known, it may have existed through several cultural periods, or its cultural position may still be unknown. This condition of our collections, as indeed holds also for most of the 7,000 or so skulls from Peru in American museums (cf. Cobb, 1933), has resulted from the fact that collectors obtained the specimens from the surface or did not excavate them carefully. I do not mean to imply that these collections are not valuable; this, in any event, would be dispelled by the general studies that already have been based thereon (cf. esp. Hrdlička, 1938, 1940; Stewart, 1931). Nevertheless, this material must be considered of secondary importance in relating physical type and culture.

In view of this situation, I decided, when an opportunity came in 1941 to make a brief visit to Peru, that my primary objective would be to search for and, if possible, to examine culturally identified material in Peruvian museums. My efforts were rewarded to a certain extent in Lima, thanks to the assistance of Dr. Julio C. Tello. I was able to study about 12 of the famous Paracas (pre-Nazca) mummies at the Museum of Anthropology (Magdalena Vieja) and a larger series of coastal Inca remains from Malena at the Archeological Museum of San Marcos University. At Chichín, thanks to a kind invitation from Sr. Rafael Larco Hoyle, I was fortunate in being able to examine a small skeletal series pertaining to two cultural periods in the Chicama-Moche-Virá region. This material is preserved in the Museo Arqueológico "Rafael Larco Herrera."

The present report deals only with the series examined at Chichín. I have felt justified in describing this new series at some length, in spite of the fact that it is small, for two reasons: (1) Because, as pointed out above, only 14 skulls certainly identified with the Early and Middle cultural periods of this region have been partly described (Kroeber, 1930), and (2) because the recent work in the vicinity of Lima by Dr. Marshall T. Newman (see Strong, 1942) will supply comparable but more extensive data for the central coast.

PROBLEMS

Even though at this stage of our knowledge it is important to record small series that are culturally identified, every effort should be made also to discover the significance of this material. Something in the

way of interpretation is possible in connection with the present series only by reason of the existence in the U. S. National Museum of a large miscellaneous collection from the "Chicama Valley." This collection probably is a random sampling from about 30 sites and represents all cultural periods.¹

Now it happens that this miscellaneous collection includes both deformed and undeformed skulls (see plates 15 and 16). This fact makes it possible to assemble statistically adequate series of undeformed skulls on the one hand and of deformed skulls on the other, on the basis of which to seek answers to the following questions: (1) How does the homogeneity of the undeformed series compare with that of other populations? (2) Were the people who deformed their heads of the same skull type as those who did not follow this custom? If in answer to the first of these questions we find a degree of homogeneity comparable to that of other Indian populations, each from one place and time, we may conclude either that the undeformed skulls found in the Chicama-Moche-Virú region are all from one cultural period, or, as is more likely, that only one physical type has occupied the region. If, conversely, this undeformed sample is found to be quite variable in many of its characters, we will be dealing of course with a mixed population. The answer to the second question, then, which is self-explanatory, should also provide data on the homogeneity of the deformed group for comparison with the undeformed.

After investigating these problems I shall discuss the classification of physical types in America as it relates to the material under consideration.

CULTURE

The division of the skeletal material seen at Chiclín into two parts representing two cultural periods had been determined prior to my visit on the basis of the associated cultural objects, chiefly pottery. Secondary evidence for the division consisted of burial custom, discoloration of the bones from accompanying pigments, and cranial deformity. These two cultural periods are known, following the Larco terminology, as Cupisnique and Mochica.

It was a pleasure to find the skeletal remains under consideration carefully preserved in individual wooden boxes constructed for the purpose. Moreover, there was ready recourse when necessary to a

¹ Hrdlička stated in 1911 that his collections from the district of Trujillo "comprise over 1100 crania" (p. 7). Referring to this collection in 1914 he states that "over 1200 crania . . . were secured" (p. 45). Although about 25 skulls have been sent away in exchanges and 42 others could not be used in the present study, the remainder numbers 996, so that there does not appear ever to have been quite so many skulls in this collection as has been stated. All this material is catalogued "Chicama Valley," but a small percentage is from the Moche Valley and intervening coast. Dr. Hrdlička tells me now that all usable exposed specimens were taken.

full photographic and written record of the excavations and of the associated cultural objects. These splendid records greatly enhance the value of the collections as well as studies based thereon.

The cultural picture, as given to me by Sr. Larco, briefly stated, is as follows²: The Cupisnique (Chavín of Tello, Middle Moche I of Bennett) skeletons are found always flexed (see pl. 17*a*). The most common position is on the back with legs flexed either both on one side or one on each side. Other positions include side or face down. The graves are relatively simple, being only a circular or elliptical hole in the ground. One to four clay pots have been found accompanying the body, together with stone vessels and various semiprecious stones used as ornaments. The pottery is usually of a dark gray color, but may be orange-red or be decorated in combinations of red and black or red and white. Usually a red pigment had been placed in the grave in small bags, which subsequently rotted away, and hence some of the bones often are found to be discolored. Metals have not been encountered in the graves.

In contrast to the Cupisnique graves those of the Mochica (Early Chimu of Kroeber, Early Moche of Bennett) are fairly elaborate. There is a boxlike chamber constructed of rectangular adobes. The shape of this tomb is variable, being either irregularly elliptical, round or rectangular, simple or multiple. Sometimes there is a rude cane coffin. The skeletons found in these tombs are always extended on the back with arms to the sides (see pl. 17*b*). Positional variations include crossing of the feet and crossing of the hands over the pelvis. Accompanying the body there have been found 1 to 133 pieces of pottery, placed at the head and/or feet, or in especially constructed containers in the walls of the tomb. In the case where 133 pieces were found with the burial they were actually covering the whole body. This pottery is characterized by designs in red and white and by a multiplicity of forms. (See also Kroeber, 1930; Bennett, 1939.) Encountered in the graves also are ornaments of gold, silver, and copper³ together with various semiprecious stones.

The Cupisnique skulls usually show the fronto-occipital ("tabular crecta" of Imbelloni) type of deformity, whereas the Mochica skulls are undeformed.

There is some disagreement as to the relative age of these two cultures. Bennett, who visited this region in 1936, before any Cupisnique graves had been found, places the Cupisnique culture as later than Mochica, on the basis of sherd analysis. He remarks "that the

² Since this was first written Sr. Larco's publication "Los Cupisniques" (1941) has appeared, which, together with "Los Mochicas" (1938, 1939), should be consulted for further details. I understand that a temporally intermediate group between Cupisnique and Mochica now has been discovered. It has been named "Salinar." Nothing has been reported as yet concerning the skeletal type.

³ Green copper stain about the alveolus and face of the skull is a common finding.

Chavín Coast ceramics are not primitive, but extremely well finished" (1939, p. 93). Sr. Larco contends that Cupisnique is the older, basing his argument on stratification (see pl. 17c), the simplicity of the graves, and the absence of metals. On the other hand, judged from the findings elsewhere along the coast as described above, it is not unusual for the custom of cranial deformity to appear early and then disappear, only to reappear in modified form in later periods. However, without attempting to decide this point I shall compare the skeletal remains of these two groups in an effort to detect differences in physical type.

DEFORMITY

Although the majority of the Cupisnique skulls were deformed, 4 of the 13 examined appeared to have no deformity. Since two of these presumably undeformed skulls have an index above 80, there is the possibility that they too may be deformed slightly. The most extreme case of deformity in this group is shown in plate 11. Here the flattening of the occiput is vertical and more on the left side than on the right. This contrasts with the Nazca type of deformity in which the occiput is rounded and usually symmetrical (pl. 13). The flattening of the frontal in this Cupisnique skull also is not so extreme as in the Nazca type, where a concave outline is not uncommon. The type of deformity characteristic of the Cupisnique skulls is fronto-vertico-occipital ("tabular erecta" of Imbelloni), whereas that found among the Nazca people is parallelo-fronto-occipital ("tabular obliqua" of Imbelloni) and perhaps of the pseudo-circular subtype (Stewart, 1941). I disagree, therefore, with Dr. Kroeber (1930, p. 67) when he says that "in many cases the fronto-occipital deformation in the Chinmu area is as pronounced as in the average Nazca culture skull, and of similar type."

Speaking of the Trajillo district as a whole, Hrdlička (1914) ultimately concluded that all the deformed skulls had been modified in the same manner (fronto-occipital) but to varying degrees; that frontal deformity had not always been permanent, or in other words that "the pressure on the forehead was inadequate to cause enduring changes in that region" (p. 48). Kroeber (1930, p. 70), however, distinguished between fronto-occipital and occipital deformity and believes that these two "preferential trends" represent different chronological periods. Although I cannot decide this point, from my analysis of the undated material from the Chicama Valley (table 1) I can understand Hrdlička's viewpoint, for degrees of frontal and occipital flattening are rather closely correlated; that is, there is a tendency when occipital flattening is pronounced, for the frontal flattening to be definite, but when occipital flattening is slight the frontal flattening usually is indistinct or absent. However, frontal flattening is quite

definite in only 10.8 percent of the collection, whereas a corresponding grade of occipital flattening occurs in at least 36.6 percent.

In many of the extreme cases the posterior part of the skull is bilobate, suggesting a deforming apparatus like that pictured by Carrión Cachot (1923, pp. 347-349) from Lambayeque. In the main, however, the deformity probably could have been produced by a cradle such as that pictured in plate 18 and dating from Chimú times. Such a cradle would permit the infant's head to turn, and this might account for the asymmetry of the occipital flattening that is to be seen in about 50 percent of all cases and is more common on the right than on the left side.

TABLE 1.—*Intensity of deformity in crania from the Chicama Valley, Peru*

Type	Number	Percent	Asymmetry	
Undeformed:				
Dolichoecranic ¹ -----	234	23.5		
Brachycranic ¹ -----	143	14.4		
	377	37.9		
Deformed:				
Front. flat. sl. or abs.; occ.	236	3.6		
flat. sl. and sym.				
Front. flat. sl. or abs.; occ.	218	21.9		
flat. sl. and asym.				
Front. flat. sl. or abs.; occ.	257	25.8	Rt. occ. flatter than Lt.----- Lt. > Rt.-----	Number
flat. mod. or pron. (sym. or asym.).				Percent
Front. flat. mod; occ. flat. mod. or pron. (sym. or asym.).	108	10.8		
	619	62.1		
				478 100.0

¹ By inspection.

² Judged to be deformed.

Even in the extreme stages of deformity a concave frontal flattening seldom is seen among skulls from the Chicama Valley. Nevertheless, the widening of the skull produced here by occipital compression is reflected in the proportions of the frontal bone; the frontal index (frontal chord/minimum frontal diameter×100) usually is over 80 and reaches as high as 94 and probably higher. On the other hand, skulls in the National Museum from Coyungó (Nazca area) not only have concave frontals but give frontal indices often between 75 and 80, and in one case below 75. These narrow frontal bones correlate with the elongated skulls that typify the Nazca type of deformity (pl. 13).

MEASUREMENTS

CRANIA

The Cupisnique series (8 males, 5 females) is too small to warrant drawing conclusions from the average measurements. The Mochica series (13 males, 8 females), although nearly twice as large, is still too small to give more than general indications.⁴ In view of this situation I have given in table 2 the averages for these two series in comparison with the miscellaneous undeformed series from the Chicama Valley described above (page 156). Since this miscellaneous series consists of 50 individuals for each sex, its averages may be considered fairly reliable.

Examination of the differences between the Mochica and the miscellaneous Chicama series shows that the mean measurements do not differ more than 2 mm. in the males and 6 mm. in the females, the average difference between the means being slightly over 1 mm. in the males and slightly under 2 mm. in the females. In the case of the six indices the average difference between the means is 1.3 units for the males and 2.3 units for the females. When the small number in the Mochica series is considered, these figures indicate a fair degree of similarity.

Although the means of these two series may show considerable resemblance, it is important also to consider the variability of all the undeformed skulls. In other words, restating the first problem listed above, how do the undeformed skulls from the Chicama-Moche-Virú region represented in these collections compare in homogeneity with other populations?

A convenient measure of variability is furnished by Howells's "mean sigma" (1941), but this is based entirely upon European series. There are only a few standard deviations available for series of American Indians and especially those from single sites or single cultures. However, from the available data I have selected three series that furnish interesting comparisons (table 3). Unfortunately, none of these is from South America. The Pecos series is interesting because it represents the undeformed and least-deformed elements from a single site; the Southern Shell Mound and Arikara series, on the other hand, represent a single culture or a single tribe as found in more than one site.

Before considering this comparison in detail, we may note that the metrical variability of a cranial series may be exaggerated by the unintentional inclusion of individuals of the other sex and of slightly deformed specimens. The difficulty of correctly sexing skulls

⁴Measurements of the individual specimens of both series are given in the appendix.

TABLE 2.—*Craniometric comparisons*¹

Measurements (cm.) and indices	Cuzisnique		Moche		Miscellaneous Chicama	
MALES						
Diam. ant.-post. max.....	(4)	17.4	(11)	17.7	(50)	17.5
Diam. lat. max.....	(4)	14.5	(11)	13.7	(50)	13.9
Bas.-breg. height.....	(6)	13.6	(11)	13.6	(50)	13.5
Cranial index.....	(4)	83.6	(11)	77.4	(50)	79.8
Mean ht. index.....	(2)	85.2	(10)	86.8	(50)	85.8
Cranial module.....	(6)	15.2	(10)	15.0	(50)	15.0
Diam. front. min.....	(8)	² 9.7	(12)	9.1	(50)	9.2
Alv. pt.-nasion.....	(6)	6.8	(12)	6.6	(43)	6.8
Diam. biz. max.....	(2)	² 13.8	(11)	13.4	(42)	13.6
Facial index, upper.....	(2)	² 47.3	(10)	48.7	(35)	50.3
Endobas.-nasion.....	(6)	10.1	(11)	10.0	(50)	10.0
Endobas.-subnas. pt.....	(6)	8.8	(11)	8.8	(50)	8.9
Endobas.-prealv. pt.....	(6)	10.3	(10)	9.8	(45)	10.0
Facial angle.....	(6)	69.0°	(11)	72.0°	(43)	70.0°
Alveolar angle.....	(6)	44.5°	(11)	51.5°	(43)	51.0°
Orbital ht. mean.....	(6)	3.3	(13)	3.3	(50)	3.4
Orbital br. mean.....	(6)	3.9	(13)	3.7	(49)	3.8
Orbital index mean.....	(6)	84.6	(13)	88.8	(49)	89.1
Nasal height.....	(6)	4.9	(13)	4.8	(50)	4.9
Nasal breadth.....	(6)	2.4	(12)	2.4	(49)	2.4
Nasal index.....	(6)	50.1	(12)	49.1	(49)	49.9
Upper alv. arch length.....	(5)	5.6	(11)	5.4	(41)	5.4
Upper alv. arch breadth.....	(4)	6.6	(10)	6.4	(35)	6.4
Upper alv. arch index.....	(4)	117.8	(10)	120.2	(35)	118.5
FEMALES						
Diam. ant.-post. max.....	(1)	17.2	(8)	17.0	(50)	16.8
Diam. lat. max.....	(1)	12.9	(8)	13.4	(50)	13.6
Bas.-breg. height.....	(2)	12.6	(6)	12.8	(50)	12.9
Cranial index.....	(1)	74.6	(8)	79.2	(50)	81.2
Mean ht. index.....	(2)	82.4	(6)	84.8	(50)	85.0
Cranial module.....	(1)	14.6	(6)	14.4	(50)	14.4
Diam. front. min.....	(4)	² 9.1	(8)	9.0	(50)	8.9
Alv. pt.-nasion.....	(4)	6.2	(4)	6.8	(46)	6.5
Diam. biz. max.....	(2)	² 13.2	(4)	12.8	(46)	12.7
Facial index, upper.....	(2)	² 47.0	(4)	52.8	(43)	51.1
Endobas.-nasion.....	(2)	9.2	(6)	9.8	(50)	9.5
Endobas.-subnas. pt.....	(1)	8.6	(4)	8.9	(50)	8.5
Endobas.-prealv. pt.....	(1)	10.0	(4)	10.2	(46)	9.6
Facial angle.....	(1)	66.5°	(4)	68.0°	(46)	69.5°
Alveolar angle.....	(1)	44.0°	(4)	49.5°	(46)	50.5°
Orbital height mean.....	(4)	3.1	(4)	3.4	(50)	3.4
Orbital breadth mean.....	(4)	3.6	(4)	3.8	(50)	3.7
Orbital index.....	(4)	84.6	(4)	91.0	(50)	91.4
Nasal height.....	(4)	4.5	(4)	4.6	(50)	4.7
Nasal breadth.....	(4)	2.4	(4)	2.4	(49)	2.4
Nasal index.....	(4)	54.8	(4)	51.3	(49)	50.6
Upper alv. arch length.....	(3)	5.0	(4)	5.5	(43)	5.2
Upper alv. arch breadth.....	(2)	5.8	(2)	6.0	(37)	6.1
Upper alv. arch index.....	(2)	117.0	(2)	107.2	(36)	116.2

¹ Measurements obviously altered by deformity not included (see Appendix for individual measurements).² Probably altered by deformity.

increases when they are isolated from the skeleton. This factor probably plays a part in the Peruvian series. As for deformity, no one can be sure of entirely excluding it, because there is then the danger of going too far and removing true brachycranial individuals. As others have noted (see Stewart, 1940), the Pecos series includes a good number of slightly deformed skulls, which fact is reflected in the high sigmas for the vault diameters and indices. Then, for our purposes, the Shell Mound and Arikara series, being largely sexed from the skeleton and being completely free from deformity, furnish the best check on variability.

TABLE 3.—*Comparative standard deviations: Males*

Measurements and indices	Combined Peruvians ¹		Pecos ²		Southern Shell Mounds ³		Arikara ⁴	
Diam. ant.-post. max	(65)	6.01	(46)	8.15	(54)	5.41	(51)	5.20
Diam. lat. max	(65)	5.46	(45)	6.14	(55)	4.92	(51)	4.27
Bas.-breg. height	(63)	4.63	(34)	6.49	(28)	3.86	(50)	4.95
Cranial index	(65)	4.44	(43)	4.81	(52)	3.24	(51)	3.20
Cranial module	(62)	3.60	(33)	5.08	(27)	2.99	(52)	3.17
Diam. front. min	(66)	4.54	(50)	6.27	(54)	4.55		
Alv. pt.-nasion	(57)	2.88	(112)	3.95	(33)	3.57	(51)	3.43
Diam. biz. max	(55)	4.79	(102)	6.17	(21)	5.27	(52)	4.49
Facial index, upper	(47)	2.46	(90)	3.28			(50)	2.85
Endobas. nasion	(63)	3.94	(27)	3.78	(28)	3.10		
Endobas.-prealv. pt	(57)	4.98	(25)	3.38				
Orbital ht., left	(58)	1.65	(117)	1.60			(43m)	1.98
Orbital br., left	(59)	1.70	(117)	1.89			(43m)	1.13
Orbital index, mean	(64)	4.21	(120)	4.57			(43)	4.53
Nasal height	(65)	2.31	(125)	2.74	(39)	2.61	(53)	2.11
Nasal breadth	(63)	1.67	(126)	1.57	(34)	2.12	(53)	1.77
Nasal index	(63)	3.94	(124)	4.27	(32)	3.83	(53)	3.63
Upper alv. arch length	(54)	2.72	(100)	2.82				
Upper alv. arch breadth	(46)	3.07	(97)	3.29				
Upper alv. arch index	(46)	6.10	(97)	6.42				

¹ Cupisnique, Mochica, and Miscellaneous Chicama (see table 2).

² Hooton (1930). Total series A: 50 or less individuals represent the "undeformed" subseries; higher numbers include deformed skulls.

³ Newman and Snow (1942). Total Shell Mound Series, table 27.

⁴ Von Bonin and Morant (1938), table 12. The figures for cranial module and upper facial index have been supplied by the author.

In examining table 3 we see that the Peruvians show about the same variability as the Arikara and Shell Mound series, except chiefly in the cranial index and the length and breadth of the skull. There seems to be good reason to believe, therefore, that this unnatural variability of the vault diameters, as in the case of the Pecos group, is caused by the inclusion of a few slightly deformed individuals. We may note that Howells (1941) reports a "mean sigma" for the cranial index of 3.22 for 23 European series, and von Bonin and Morant (1938) give 3.12 for 14 North American Indian series comprising 1,073 skulls.

These findings have suggested to me that by removing the most brachycranic and presumably slightly deformed skulls from the "undeformed" Peruvian series, until a more natural variability is obtained, I could obtain a truer undeformed range, as well as a truer mean. Acting on this thought, I have reduced arbitrarily the male range from 68.2-90.5 to 68.2-82.6. This deletion results in the following distribution:

<i>Class</i>	<i>New series</i>	<i>Removed</i>
65-69.9-----	1	--
70-74.9-----	7	--
75-79.9-----	25	--
80-84.9-----	17	8
85-89.9-----	--	6
90-94.5-----	--	1
Total -----	50	15

The new series gives a standard deviation of 3.29 for the cranial index and a mean of 77.8. The length then becomes 177 mm. (S. D. 5.53) and the breadth 138 mm. (S. D. 4.62). These means are close to those of the Mochica series given in table 2 and probably approximate the true undeformed type.

Since we have definite evidence now from this northern coastal region that cranial deformity is linked with culture, it is desirable to know whether the custom of deforming the head was introduced without a physical change in population, or whether there was a population replacement by a physically different people who practiced this custom. This is the second problem listed above. In attempting to solve this I have measured a series of 50 deformed Chicama Valley skulls of each sex for additional comparison with the miscellaneous undeformed series. The measurements have been restricted to those that I have assumed to be least affected by deformity, which means chiefly facial measurements. In table 4 I give the differences between the means of these two series together with their probable errors and \times p. e.'s.

Of the 12 measurements and indices here listed, 6 show higher and 4 show lower means for the deformed group in both sexes. The two remaining measures show very small differences that vary in opposite directions in the two sexes. Two of the higher means in the males and three in the females appear to be significantly different; that is, they exceed three times their probable errors. It is noteworthy as regards the higher measurements in the deformed group that face height and orbital height are increased significantly in both sexes, while there is also an increase in nose height in both sexes that approaches significance at least in the males. This increase in the absolute heights of the face, orbits, and nose cannot be reconciled with the type of deformity present.

TABLE 4.—*Metrical differences (mm.) between deformed and undeformed crania: Miscellaneous Chicama*

Deformity	No.	Range	Mean \pm p. e.	\times p. e.
MALES				
ALVEOLAR POINT-NASION				
Undeformed.....	57	62-75	67. 53 \pm 0. 26	6. 02
Deformed.....	49	63-77	70. 00 \pm 0. 32	
Difference.....			2. 47 \pm 0. 41	
ENDORASION-NASION				
Undeformed.....	63	92-109	100. 24 \pm 0. 33	5. 17
Deformed.....	54	87-105	97. 76 \pm 0. 35	
Difference.....			2. 48 \pm 0. 48	
ENDORASION-PREALVEOLAR POINT				
Undeformed.....	57	88-108	100. 00 \pm 0. 44	2. 03
Deformed.....	50	90-110	98. 74 \pm 0. 43	
Difference.....			1. 26 \pm 0. 62	
ORBITAL HEIGHT, LEFT				
Undeformed.....	58	30-37	33. 53 \pm 0. 15	5. 00
Deformed.....	52	31-39	34. 58 \pm 0. 15	
Difference.....			1. 05 \pm 0. 21	
ORBITAL BREADTH, LEFT				
Undeformed.....	59	33-41	37. 71 \pm 0. 15	2. 52
Deformed.....	50	35-42	38. 24 \pm 0. 16	
Difference.....			0. 53 \pm 0. 21	
ORBITAL INDEX, MEAN				
Undeformed.....	64	79. 0-101. 8	89. 01 \pm 0. 36	2. 51
Deformed.....	54	77. 8-100. 0	90. 39 \pm 0. 44	
Difference.....			1. 38 \pm 0. 57	
NASAL HEIGHT				
Undeformed.....	65	44-53	48. 60 \pm 0. 19	2. 59
Deformed.....	54	45-57	49. 35 \pm 0. 22	
Difference.....			0. 75 \pm 0. 29	

TABLE 4.—*Metrical differences (mm.) between deformed and undeformed crania:*
Miscellaneous Chicama—Continued

Deformity	No.	Range	Mean±p. e.	×p. e.
MALES—Continued				
NASAL BREADTH				
Undeformed.....	63	21-28	24.27±0.14	
Deformed.....	54	20-27	23.54±0.14	
Difference.....			0.73±0.20	3.65
NASAL INDEX				
Undeformed.....	63	42.3-60.0	49.95±0.34	
Deformed.....	54	41.7-58.7	47.75±0.32	
Difference.....			2.31±0.47	4.91
UPPER ALVEOLAR ARCH LENGTH				
Undeformed.....	54	49-60	54.28±0.25	
Deformed.....	49	49-59	54.35±0.22	
Difference.....			0.07±0.33	0.21
UPPER ALVEOLAR ARCH BREADTH				
Undeformed.....	46	59-73	64.26±0.30	
Deformed.....	45	59-73	65.20±0.29	
Difference.....			0.94±0.42	2.24
UPPER ALVEOLAR ARCH INDEX				
Undeformed.....	46	108.5-134.0	118.71±0.61	
Deformed.....	44	111.3-134.6	120.15±0.57	
Difference.....			1.44±0.83	1.73
FEMALES				
ALVEOLAR POINT-NASION				
Undeformed.....	52	57-75	65.00±0.36	
Deformed.....	51	59-72	66.39±0.27	
Difference.....			1.39±0.45	3.09
ENDORASION-NASION				
Undeformed.....	57	91-103	95.62±0.25	
Deformed.....	51	86-98	91.51±0.30	
Difference.....			4.11±0.39	10.54

TABLE 4.—*Metrical differences (mm.) between deformed and undeformed crania: Miscellaneous Chicama—Continued*

Deformity	No.	Range	Mean \pm p. c.	\times p. c.
FEMALES—Continued				
ENDOBASION-PREALVEOLAR POINT				
Undeformed.....	50	91-107	97. 02 \pm 0. 34	6. 02
Deformed.....	47	88-106	94. 19 \pm 0. 33	
Difference.....			2. 83 \pm 0. 47	
ORBITAL HEIGHT, LEFT				
Undeformed.....	55	30-37	33. 66 \pm 0. 14	3. 90
Deformed.....	52	31-37	34. 44 \pm 0. 14	
Difference.....			0. 78 \pm 0. 20	
ORBITAL BREADTH, LEFT				
Undeformed.....	54	34-41	36. 82 \pm 0. 12	1. 22
Deformed.....	52	34-41	36. 60 \pm 0. 13	
Difference.....			0. 22 \pm 0. 18	
ORBITAL INDEX, MEAN				
Undeformed.....	56	78. 4-100. 0	91. 31 \pm 0. 39	3. 71
Deformed.....	52	85. 1-101. 4	93. 20 \pm 0. 33	
Difference.....			1. 89 \pm 0. 51	
NASAL HEIGHT				
Undeformed.....	56	42-53	46. 55 \pm 0. 23	1. 57
Deformed.....	52	41-51	47. 02 \pm 0. 20	
Difference.....			0. 47 \pm 0. 30	
NASAL BREADTH				
Undeformed.....	55	20-28	23. 69 \pm 0. 16	2. 81
Deformed.....	52	20-27	23. 10 \pm 0. 14	
Difference.....			0. 59 \pm 0. 21	
NASAL INDEX				
Undeformed.....	55	43. 5-58. 7	50. 88 \pm 0. 37	3. 26
Deformed.....	52	40. 8-60. 0	49. 22 \pm 0. 35	
Difference.....			1. 66 \pm 0. 51	

TABLE 4.—*Metrical differences (mm.) between deformed and undeformed crania: Miscellaneous Chicama—Continued*

Deformity	No.	Range	Mean \pm p. e.	\times p. e.
FEMALES—Continued				
UPPER ALVEOLAR ARCH LENGTH				
Undeformed_____	49	48-58	52. 51 \pm 0. 25	1. 19
Deformed_____	48	48-59	52. 08 \pm 0. 26	
Difference_____			0. 43 \pm 0. 36	
UPPER ALVEOLAR ARCH BREADTH				
Undeformed_____	40	55-67	60. 96 \pm 0. 29	1. 10
Deformed_____	47	55-66	61. 38 \pm 0. 25	
Difference_____			0. 42 \pm 0. 38	
UPPER ALVEOLAR ARCH INDEX				
Undeformed_____	39	103. 4-127. 1	115. 82 \pm 0. 66	2. 43
Deformed_____	45	103. 8-129. 2	117. 98 \pm 0. 60	
Difference_____			2. 16 \pm 0. 89	

Of the four lower means in the deformed group, two—endobasion-nasion, endobasion-prealveolar point—probably can be explained by the deformity.⁵ The decrease in endobasion-nasion is significant statistically in both sexes, and that for endobasion-alveolar point is significant at least in the females. The decrease in nasal breadth and the lowering of the nasal index, which also are statistically significant in both sexes (except for nasal breadth in the female, which approaches significance), are contrary to the general broadening of the face that might be expected from the deformity.

Thus it seems to me that the lengthening of the face and narrowing of the nose in the deformed group, being contrary to changes that might be expected from the type of deformity present, and being statistically significant, indicate a true physical difference between the two populations. Moreover, the deformed sample seems to be somewhat more homogeneous than the undeformed, if we can judge by the standard deviations of the facial measurements shown in table 5.

⁵ Shapiro's attempt (1928) to find "a correction for artificial deformity of skulls" is based on the assumption that basion-nasion is unaffected by deformity. In support of this premise he cites figures for two Patagonian series, two Middle Mississippi cultural groups from Ohio and Tennessee, and the Pecos series. It is quite unlikely that the degree of deformity in any of these groups equals that in the Peruvians under consideration, especially as it affects the base of the skull. The circular deformity of the Patagonians would not alter the cranial base as much as the occipital flattening of the Pueblos, but the latter even is less extreme in this respect than would be expected owing to its frequently asymmetrical character.

TABLE 5.—*Standard deviations of measurement least affected by deformity*

Measurements and indices	Male		Female	
	Undeformed	Deformed	Undeformed	Deformed
Alv. pt.-nasion-----	(57) 2. 88	(49) 3. 27	(32) 3. 88	(51) 2. 83
Endobas.-nasion-----	(63) 3. 94	(54) 3. 77	(57) 2. 82	(51) 3. 15
Endobas.-prealv. pt-----	(57) 4. 98	(50) 4. 47	(50) 3. 59	(47) 3. 37
Orbital ht., left-----	(58) 1. 65	(52) 1. 64	(55) 1. 49	(52) 1. 55
Orbital br., left-----	(59) 1. 70	(50) 1. 71	(54) 1. 33	(52) 1. 42
Orbital index, mean-----	(64) 4. 21	(54) 4. 85	(56) 4. 34	(52) 3. 50
Nasal height-----	(65) 2. 31	(54) 2. 38	(56) 2. 59	(52) 2. 10
Nasal breadth-----	(63) 1. 67	(54) 1. 55	(55) 1. 73	(52) 1. 55
Nasal index-----	(63) 3. 94	(54) 3. 50	(55) 4. 06	(52) 3. 73
Upper alv. arch length-----	(54) 2. 72	(49) 2. 25	(49) 2. 59	(48) 2. 62
Upper alv. arch breadth-----	(46) 3. 07	(45) 2. 90	(40) 2. 72	(47) 2. 54
Upper alv. arch index-----	(46) 6. 10	(44) 5. 59	(39) 6. 12	(45) 6. 03

LONG BONES

Some long bones were present in 12 individuals from the Cupisnique group, but in only 3 Mochicas. As a result, when the measurements are subdivided according to sex and side, the greatest number in one group is 5. Owing to these small numbers and the lack of suitable comparative data, I have preferred to give the individual measurements rather than averages (tables 6-8). However, for the femur (table 7) I have included Hrdlička's (1938) averages on a miscellaneous Chicama series. This series differs from that given in connection with the skull in that it represents the total population of the valley and not just that part practicing, or not practicing, deformation.

Because the culturally dated material is so scanty, it is impossible to determine whether the Cupisnique and Mochica peoples differed in stature. It will be useful, however, in connection with the subsequent discussion to know the approximate stature of these peoples. The best figures are perhaps obtained from Hrdlička's femur and tibia lengths⁶ with the aid of Pearson's formula c (1898): namely, 159.4 cm. for males and 147.7 for females.

⁶ I am indebted to Dr. Hrdlička for supplying me with the tibial length of the Chicama series from his manuscript: Average for 200 male right, 34.76 cm.; 150 female right, 31.97 cm.

TABLE 6.—*Individual measurements (cm.) of the upper extremity bones*

No.	Humerus:				Radius: Lt. max.	Ulna: Lt. max.	Clavicle: Lt. max.
	Lt. max.	Diam. max. at middle	Diam. min. at middle	Index of shaft			
CUPISNIQUE, MALE RIGHT							
CU 4					24.0	25.4	13.1
CU 5	30.7	2.0	1.7	85.0			
CU 7	30.4	2.1	1.7	81.0			15.9
CU 10							13.6
CU 12							14.8
CU 13	28.1	1.9	1.6	84.2	21.2		12.8
MOCHICA, MALE RIGHT							
M 16	30.6	2.1	1.5	71.4			
M 19							13.6
CUPISNIQUE, MALE LEFT							
CU 4	29.3	1.8	1.5	83.3		24.8	13.5
CU 5	30.1	2.1	1.5	71.4			15.9
CU 7					23.1?		
CU 12					21.5		
CU 13							12.7
MOCHICA, MALE LEFT							
M 16	29.7	2.1	1.5	71.4			14.7
M 19						24.0	13.4
CUPISNIQUE, FEMALE RIGHT							
CU 1					21.5		
CU 3	27.6	1.9	1.4	73.7			13.2
CU 9	27.3	1.6	1.6	100.0	20.3	21.6	12.7
CUPISNIQUE, FEMALE LEFT							
M 1	27.9	1.6	1.2	75.0	21.5		13.3
M 3	27.4	1.8	1.4	77.8	20.4		13.2
M 9	26.8	1.6	1.4	87.5	20.3		13.0
M 11					19.0		

TABLE 7.—*Individual measurements (cm.) of the femur compared with averages for a Miscellaneous Chicama series*

No.	Lt. max.	Lt. bi-cond.	Diam. a.-p. at middle	Diam. lat. at middle	Index of shaft	Diam. max. upper flat.	Diam. min. upper flat.	Platymeric index
CUPISNIQUE, MALE RIGHT								
CU 4-----		38.8	2.4	2.4	100.0	3.0	2.1	70.0
CU 5-----	40.2	40.0	2.5	2.5	100.0	3.1	2.2	71.0
CU 10-----	41.7	41.3	2.6	2.5	96.2	3.3	2.3	69.7
CU 13-----	38.7	38.4	2.7	2.3	85.2	2.7	2.3	85.2
MOCHICA, MALE RIGHT								
M 19-----		40.2	2.5	2.4	96.0	3.0	2.2	73.3
MISCELLANEOUS CHICAMA, MALE RIGHT ¹								
-----	41.3	40.9	2.7	2.7	99.6	3.3	2.3	69.6
CUPISNIQUE, MALE LEFT								
CU 2-----	38.2	37.9	2.3	2.1	91.3	2.8	1.9	67.8
CU 5-----	39.9	39.7	2.5	2.7	108.0	3.3	2.2	66.7
CU 8-----	39.6	39.4	2.7	2.4	88.9	2.8	2.2	78.6
CU 10-----	41.8	41.3	2.6	2.4	92.3	3.4	2.3	67.6
CU 13-----	38.7	38.5	2.7	2.4	88.9	2.8	2.4	85.7
MISCELLANEOUS CHICAMA, MALE LEFT								
-----	41.8	41.4	2.7	2.7	100.4	3.3	2.3	69.7
CUPISNIQUE, FEMALE RIGHT								
CU 1-----	38.4	37.9	2.4	2.2	91.7	2.6	2.0	76.9
MOCHICA, FEMALE RIGHT								
M 18?-----	41.9	41.6	2.9	2.4	82.8	2.9	2.2	75.9
MISCELLANEOUS CHICAMA, FEMALE RIGHT								
-----	37.8	37.4	2.3	2.3	100.9	2.8	2.0	68.5
CUPISNIQUE, FEMALE LEFT								
CU 1-----	38.9	38.3	2.4	2.2	91.7	2.5	1.9	76.0
CU 9-----	37.6	37.2	2.3	2.0	87.0	2.4	1.9	79.2
MISCELLANEOUS CHICAMA, FEMALE LEFT								
-----	37.9	37.4	2.3	2.3	101.8	2.8	2.0	69.4

¹ Hrdlička, 1933. Males: 200 right, 200 left; females: 200 right, 150 left.

TABLE 8.—*Individual measurements (cm.) of the tibia and fibula*

No.	Tibia				Fibula: Lt. max.
	Lt. in position	Diam. a.-p. at middle	Diam. lat. at middle	Index of shaft	
CUPISNIQUE, MALE RIGHT					
CU 8.....	34. 0	3. 0	2. 1	70. 0	-----
CU10.....	35. 4	2. 8	1. 9	67. 8	34. 6
CUPISNIQUE, MALE LEFT					
CU 4.....	34. 6	2. 8	2. 1	75. 0	-----
CU 5.....	33. 6	3. 0	1. 8	60. 0	32. 8
CU 8.....	33. 9	3. 1	2. 1	67. 7	-----
CU10.....	35. 0	2. 8	1. 9	67. 8	-----
CU13.....	31. 5?	2. 9	2. 2	75. 9	-----
MOCHICA, MALE LEFT					
M19.....	32. 6	3. 0	1. 7	56. 7	-----
CUPISNIQUE, FEMALE RIGHT					
CU 1.....	32. 9	2. 4	1. 8	75. 0	-----
CU 9.....	-----	-----	-----	-----	29. 2
CU11.....	29. 3	2. 5	1. 8	72. 0	28. 3
CUPISNIQUE, FEMALE LEFT					
CU 9.....	31. 1	2. 3	1. 8	78. 3	-----
CU11.....	29. 4	2. 5	1. 8	72. 0	-----

DISCUSSION

The foregoing analysis of the skeletal remains of two culturally distinct populations from the north coast of Peru emphasizes the fact that the only demonstrable morphological difference between them is based upon the presence or absence of cranial deformity. Partly, of course, this similarity may be due to the small number of specimens available, for certain suggestive differences do appear to distinguish the whole collection of deformed and undeformed crania of the Chicama Valley. For the present, therefore, these data on culturally identified skeletons are of value for this indication, since heretofore there has been a lack of even this much information.

In analyzing the culturally identified material I have introduced measurements on a larger and probably statistically adequate series of undeformed crania from the Chicama Valley, and have shown that it is fairly homogeneous. Unfortunately, we can never know the cul-

tural composition of this series; still it can serve for comparisons with other undeformed populations as data thereon become available. Since such data are not yet available from Peru, I have not considered it necessary at this time to make extensive comparisons beyond this area.⁷

In this connection, possibly because of being a North American working with South American materials, I should like to examine a statement to which rather frequent reference has been made in the recent Latin American literature, namely, that the Old Peruvians and the Pueblos of Arizona and New Mexico are of one and the same physical type. The current advocate of this generalization is Imbelloni (1938), but the idea appears to have been initiated by Ten Kate (1894). As far as I can discover no one has supported with figures the claimed unity and distribution of this physical type.

First, let us consider the claims. Ten Kate, because of his experiences in Mexico and our Southwest, was struck by certain ethnographic resemblances to this region when he visited the provinces of Catamarca, Tucumán, and Salta in Argentina (1894). However, it was not until 1896, when he published his report on the skeletal remains of the Calchaqui, that he called attention to the physical resemblances. He says (p. 62):

⁷ Since this was first written Dr. M. T. Newman has kindly permitted me to read and quote from his manuscript entitled "Indian Skeletal Material from the Central Coast of Peru; an Archeologically Oriented Study in Physical Anthropology." Rather than attempt to synthesize fully his and my findings, I shall call attention merely to some points that are of especial interest here.

Doctor Newman has assembled four series of crania, each from a different period and a different valley and varying in number from 14 to 41. Although certain differences are detected from period to period, they are not extensive or constant, and Doctor Newman believes that he is dealing primarily with only one physical type. This type, it should be noted, is brachyranic. The cranial indices of all the undeformed males give the following frequency distribution in relation to that for the Chicama Valley (see p. 163):

<i>Class</i>	<i>Central Coast</i>	<i>Chicama Valley</i>
65-69.9	—	1
70-74.9	4	7
75-79.9	9	25
80-84.9	42	25
85-89.9	20	6
90-94.9	4	1
	79	65

According to these distributions, and in spite of the inclusion in both series of some slightly deformed individuals, there appears to be a distinctly greater tendency toward brachyranism on the central coast.

As for fronto-occipital deformity, Doctor Newman found it to be present in practically all his earliest or "Shell Mound" crania. In the Early (Interlocking Style) Period the incidence falls to about one-third, but in the Middle Period it increases to about two-thirds. Finally, in the Late Period intentional deformity almost disappears, and the great majority of the crania are either undeformed or show slight to moderate posterior flattening. This situation seems to parallel that in the Chicama-Moche-Virú region, where intentional deformity is present in the Cupisnique period, disappears in the subsequent Moche period, and reappears later only to taper off ultimately.

In leaving South America in order to search farther north for affinities or resemblances, our thought is arrested involuntarily first of all at central Mexico, then finally at the plains and canyons of Arizona and New Mexico. There are above all the crania from ancient sepulchers of Santiago Tlatelolco described by Hamy [1891], which by their general morphology, their strong brachycephaly and the high indices of the orbit and nose recall certain types of our Calchaqui series. The practice of enterring the flexed body in pottery vessels was likewise followed by this ancient population, a custom which, as Hamy remarks, was, with numerous variations, adopted by a great many American tribes, without indicating by that necessarily an ethnic affinity. As for the Saladoans and Cibolans [Matthews, 1891], representatives of the ancient civilization known as Shilwi, which I have compared so many times with the Calchaquis, there remains only to recall their excessive brachycephaly, their small stature, their free hyoid bones, and finally the mythico-religious and mythico-sociologic analogies, which must exist in these two civilizations at their extreme limits and which I have already summarized elsewhere some years ago [1894].

When we examine the "excessive brachycephaly" referred to here we find that it is largely, if not entirely, due to artificial deformity. Thus, ten Kate reports (1896, p. 31) that 60 percent of his Calchaqui skulls are definitely deformed and many others show asymmetry (plagiocephaly). He says further (p. 22) that the frontal bone is commonly flattened and that the resulting deformity type is like that from Trujillo, Peru.⁸ We may suspect deformity also in the case of Hamy's six crania from Santiago Tlatelolco, Mexico, since the cranial indices range from 81 to 91. As for Matthews' Pueblos, he says quite frankly:

The occipital flattening here referred to, must be carefully distinguished from that produced intentionally by the ancient Peruvians, by the Flatheads of our Northwest coast, and by other races. In the latter there is an anterior counter-flattening produced by the pressure applied to the forehead; in the former there is no frontal flattening (p. 173).

There are 16 skulls which, if never seen in connection with the rest of the collection, might readily be regarded as normal skulls. Taken by themselves, the fact that they are deformed is not obvious; studied along with the rest of the group, where there is every gradation from the most unquestionably flattened to the apparently normal, the observer has no doubt that the causes which operated in distorting the former class have had their effect too in shaping the latter, and he feels uncertain where, in any shortened skulls, he is to draw the dividing line between the normal and the abnormal (p. 178).

Independently of ten Kate, and on the sole basis of a trip around the world that did not include South America or our Southwest, Bonarelli (1909) related the Pueblos and Andean peoples in a classification of mankind. The whole matter is disposed of in the following brief statement (p. 963):

I call by the name "Pueblo-Andinian" the population inhabiting the more or less mountainous parts of Arizona, Colorado, New Mexico, Central America,

⁸ Cf. also Virchow, 1892, p. 11.

and the Andes Mountains of South America (Mochi, Pueblos, Apaches, Peruvians, Araucanians, Tehuelchi or Patagonians, etc.) These peoples present generally an extreme similarity between male and female physiognomies, cranium similarly brachycephalic, very broad face with rounded chin.

Von Eickstedt's classification of 1933, while not combining North and South American groups, nevertheless indicates certain similarities and differences, especially as between the groups here under discussion. It will be noted that his arrangement is based almost entirely on the living; thus, he says (pp. 721-724):

Before we turn to the treatment of the remains and the diffusion of these four South American races, let us note, if only for nemotechnical reasons, the very clear connection between area and race. The four regions of the southern continent are as follows: (1) The extended chain of the Andean Mountains on the west coast, (2) the broad tablelands in the southeastern part terminating in a point to the south, (3) the large forest-covered basin of the Amazon in the interior of Brazil, and finally (4) the Brazilian mountainous area in the east. To these correspond respectively the above mentioned races of the (1) Andids, (2) Pampids, (3) Brazilids, and (4) Lagids, if we overlook for the moment slight overlappings and displacements.

Moreover, there is remarkable agreement between the large groups of Hominidae in North and South America. Here as there we have four races, and even two round- and two long-headed races in each. Here as there the round-headed races inhabit either the mountains (Andids and Pacifids) or the south (Pampids and Centralids); whereas the long-heads dwell in the northern forests (Brazilids and Silvids) or as older strata on the marginal areas (Lagids and Margids). This is of course no accident.

Andids.—The arc of the western and central round-headed races of North America is continued on South American territory in the race of the Andids which, directly adjoining the Centralids,⁹ occupies the long range of the Andes. Just as the Centralids are the culture-race of the North, so are the Andids that of the South. But where the generally higher culture of the Centralids has only succeeded to a slight degree—if in itself of note—in producing realistic likenesses of human beings, the Andids, especially of the Pre-Incan era (Proto-Chimu culture), became masters of the art of reproducing the human features. . .

In physical types the Andids are medium round-headed, short to moderately long-faced, and rather short statured, being quite similar to the neighboring Centralids in that respect, as even d'Orbigny [1839] had already observed. But the features themselves are essentially different. The lines are marked, sharply drawn; the nose long, often aquiline and very prominent; and the cheek bones very prominent. The shape, however, is short and plump. There is therefore nothing of the Centralid delicacy and almost European configuration of the face. . .

Finally, Imbelloni (1938) has sought to improve upon the foregoing classifications, and particularly that of von Eickstedt. In addition to substituting a geographical terminology, Imbelloni has divided von

⁹ According to von Eickstedt the area occupied by the Centralids includes the Pueblo region, Gulf States, parts of Mexico, and Central America.

Eickstedt's Centralid group and combined the Pueblo portion with the Andean: Pueblo-Andid. The remaining portion, which embraces the peoples of southern Mexico, the Isthmus and adjoining parts of Colombia, he regards as a separate subdivision and gives to it the name "Isthmid."¹⁰ Of the Pueblo-Andid group he says in part (pp. 235-236):

Habitat.—What will draw attention to my map is the discontinuous character of the area, whose two sections, one of the northern continent and the other of South America, are separated by a wide gap. We shall see, in speaking of the Isthmids, that this discontinuity of the total area is to be interpreted as a recent phenomenon in the ethnographic history of America, and that the two sections are to be understood as originally connected. The northern part, or that of the Pueblos, comprehends all the territory in which skeletal remains of the inhabitants of the "stone houses" and "plateaus" and the "cliffs" (Pueblos and cliff-dwellers) have been exhumed, with an archeological trousseau [ajuar] that in its abundance clearly distinguishes them from all the tribes that followed, no less than do physical characteristics, stature, indices, etc. We are dealing with the basins of the Rio Grande, the Colorado, and part of the Gila and Salado rivers, etc., and mountainous, semi-arid regions noted for cacti. The small number of living survivors of this ancient human group cannot give an exact indication of the extension of the original area; they live especially in Arizona and New Mexico, surrounded and almost ignored by the new arrivals: Apache, Navajo, etc. An extension of the brachyoid area of the Pueblos is observable in the section east of the Mississippi; the ancient skulls of Florida attest to the existence of a stratum that later was submerged by the migration of Amazonians coming by way of the arc of the Antilles.

The southern section includes part of Colombia, Ecuador, Peru, Bolivia, northern and central Chile, the Andean region of the Argentine Republic and the Chaco of Santiago.

Diagnosis.—Men of small stature (from 1.59 m. to 1.62 m.). Skull brachymorphic (cephalic index from 81.5 to 89), partly exaggerated by the effects of cranial deformation (both in the northern and the southern area the artificial form "tabular erecta" is frequent; it is absolute in the Pueblos and predominant in the areas in the extreme south of the South American section: Calchaqui and Chaqueños of the Salado River). Small head, especially in the women, but without platycephaly; short face; nose with broad base, but with sufficiently long and salient dorsum; bizygomatic diameter notably large. Torso quite developed in comparison with the limbs; thorax convex. Cutaneous color variable, but with a predominance of intense pigmentation. Body hair sparse; head hair coarse and flat, black; iris obscure.

¹⁰ The two terminologies compare as follows (Imbelloni, 1938):

<i>Von Eickstedt</i>	<i>Imbelloni</i>
Eskimid	Subarcticid
Pacifid	Columbid
Silvid	Planid
Margid	Sonorid
Centralid }	{ Isthmid
Andid }	{ Pueblo-Andid
Brasilid	Amazonid
Pampid	Pampid
Lagid	{ Laguid
	{ Fueguid

These diagnostic characteristics, it will be recognized, are rather indefinite, being derived partly from the living and partly from the skeleton. Moreover, some of these characters, such as broad face, large trunk, deep pigmentation, sparse body hair, and coarse black head hair, are generalized Indian features. Although Imbelloni recognizes the effect of deformity upon the cephalic index, he does not recognize the essential difference in the types of deformity in the two areas, as pointed out by Matthews as long ago as 1891. (See above.)

The data furnished by the present study, together with other recent studies, permit us now to evaluate to a greater extent than heretofore the differences between some of these physical types. In table 9 I have assembled four undeformed cranial series that can be assigned to three of von Eickstedt's groupings. The Peruvians, as we have seen, are distinguished from the Pueblos by von Eickstedt, but united into a single group by Imbelloni. The identification of the Spoon River group (Illinois) as Centralid by Neumann, places it in the same group as the Pueblos according to both classifications. The third physical type, Sylvid of von Eickstedt or Planid of Imbelloni, is furnished by Neumann's identification of the Maples Mills group (Illinois).

TABLE 9.—Average differences between cranial measurements (mm.) of various Indian types: Males

Measurements	Miscellaneous Chicana (Ancid) ¹	Old Zuni ² (Centralid)	Maples Mills ³ (Sylvid)	Spoon River ³ (Centralid)	Differences		
					1-2	3-4	2-1
<i>Maximum number</i>	(50)	(32)	(24)	(27)			
Diam. ant.-post. max.....	176.8	176.3	182.5	180.1	-0.5	-2.4	+3.8
Diam. lat. max.....	137.6	132.1	137.4	140.0	-5.5	+2.6	+7.9
Bas.-breg. height.....	135.1	133.3	141.7	145.6	-1.8	+3.9	+12.3
Cranial index.....	77.8	74.9	75.4	77.8	-2.9	+2.4	+2.9
Mean ht. index.....	86.0	86.5	88.6 ⁴	91.0 ⁴	+0.5	+2.4	+4.5
Alv. pt.-nasion.....	68.2	73.3	75.1	75.0	+5.1	-0.1	+1.7
Diam. biz. max.....	135.0	133.8	136.5	140.4	-1.2	+3.9	+6.6
Facial index, upper.....	69.2	54.6	54.9	53.3	+4.4	-1.6	-1.3
Endobas.-nasion.....	100.4	99.5	104.2	105.5	-0.9	+1.3	+6.0
Endobas.-prealv. pt.....	100.3	98.0	98.8	102.1	-2.3	+3.3	+4.1
Orbital ht. mean.....	33.9	34.9	35.0	34.4	+1.0	-0.6	-0.5
Orbital br. mean.....	38.0	37.9	?	?	-0.1	?	?
Orbital index mean.....	89.1	92.0	?	?	+2.9	?	?
Nasal height.....	48.9	51.0	54.0	53.5	+2.1	-0.5	+2.5
Nasal breadth.....	24.4	25.2	26.1	27.0	+0.8	+0.9	+1.8
Nasal index.....	49.9	49.3	48.5	50.4	-0.6	+1.9	+1.1
Upper alv. arch length.....	51.3	54.2	54.6	56.7	-0.1	+2.1	+2.5
Upper alv. arch breadth.....	64.3	64.7	65.7	67.6	+0.4	+1.9	+2.9
Upper alv. arch index.....	118.5	119.6	121.2	118.0	+1.1	-3.2	+1.6
Average difference.....					1.80	2.06	3.76

¹ Names in parentheses refer to von Eickstedt's classification (1933). For the equivalent terms in Imbelloni's classification (1938), see footnote 10, p. 175.

² Hrdlička, 1931, pp. 7-10.

³ Neumann, 1941b, p. 80.

⁴ Calculated from means.

The comparison carried out in table 9 is by means of the simple and probably crude device known as the average difference of the means. This method has been employed by Shapiro and others to call attention to metrical similarities among peoples of the far north (see Stewart, 1939). According to the current interpretation of the average difference, a figure that approaches 2 suggests a doubtful identity of type. From this point of view there is little justification for grouping together the Pueblo and Spoon River groups. On the other hand, the Spoon River and Maples Mills groups are perhaps properly separated as different types. However, if an average difference of 2.06 is sufficient to separate Centralid from Sylvid, it is debatable whether a difference of 1.8 is sufficiently low to warrant the union of the Pueblos and Peruvians.

Viewed from another angle, the first two groups in table 9 represent peoples of small build, whereas the last two groups are of large build. This difference in build is reflected in the high average difference between groups 2 and 4. Now, if instead of comparing sizes we compare shapes, we find that the average differences between the indices are 2.06 (groups 1-2), 2.30 (3-4), and 2.28 (2-4). Thus, the Peruvians are distinguished from the Pueblos by having a distinctly rounder head, broader face, and lower orbits. Both of these groups in turn are distinguished from the remaining two groups chiefly by the difference in relative head height.

The data on stature are also of interest in the present connection. We have seen that male stature in the Chicama Valley, as computed by Pearson's formula c , is 159.4 cm. Hooton's data on the Peccos Pueblo (1939) when handled in the same way yield a figure of 162.2. Also, Hooton's data on Madisonville (1920), which Neumann (1941a) has identified as Centralid, give a stature near 167 cm. The Sylvids are probably just as tall as the Madisonville population. Although these figures may be regarded as comparable within the limitations of the series, because they are all calculated in a like manner, they do not entirely accord with the data on the living. Thus, the modern highland male population through Ecuador, Peru, and Bolivia has a stature close to 160 cm. (cf. Gillin, 1941; Hurtado, 1932); the recent Pueblos average 164 cm. (Hrdlička, 1935).

These facts all go to show that the generalization we have been considering is based upon too little knowledge of the physical composition of the American Indians. Although this criticism naturally does not invalidate the general classificatory scheme, nevertheless it casts doubts upon the scale of the differences that distinguish the individual types, as well as their distribution and number.

Everyone will admit that the American Indian is variable in all his physical characters and, furthermore, that some temporal and

geographical segregation of these characters is evident. In spite of this there has been remarkably little effort to define clearly the numerous physical types that have been named. This circumstance introduces an element of subjectivity into the matter and makes it difficult for others to judge the validity of published statements concerning the identification of types. Consequently, the whole science is threatened with a meaningless jargon.

Unfortunately, such classifications have a way of catching the imagination, so whatever misconceptions they introduce are likely to be disseminated widely. Already these types, which grade into one another, are being visualized as distinct entities. This in turn becomes an argument for the polygenesis of the American Indian.

CONCLUSIONS

Having dealt so extensively with a generalization associated with the basic material of this study, it is desirable that all the conclusions be summarized here.

First, I shall point out that the Cupisnique and Mochica skeletal remains, here described for the first time in some detail, are inadequate for satisfactory metrical comparison. The only obvious physical difference between the two groups is the fronto-occipital deformity—a cultural trait registered in bone—which is present in the Cupisnique group alone. However, in view of the scarcity of data on culturally associated skeletal material from Peru, I feel that even the present record is a contribution.

In expanding this study to include the miscellaneous undated skulls from the Chicama-Moche-Virú region, I have attempted to answer two questions: (1) How does the homogeneity of the undeformed series compare with that of other populations? and (2) Were the people who deformed their heads of the same skull type as those who did not follow this custom? The answer to the first of these questions seems to be that the miscellaneous undeformed Chicama series is about as homogeneous as the American undeformed crania available for comparison from one culture or site.

As for the second question, I have concluded that there are certain significant differences between the deformed and undeformed series that are independent of deformity. There is a possibility, therefore, that these differences likewise may distinguish the Cupisnique and Mochica groups.

Finally, I have used the undeformed Chicama series as an example of the Pueblo-Andid physical type, defined by Imbelloni, for the purpose of carrying out metrical comparisons with a representative Pueblo series, as well as with series representing other physical types. My conclusion is that, as it stands now, this classification of American

Indians into several physical types is a generalization based upon rather meager evidence as to their physical make-up. At least until the types are defined better, particularly in reference to skeletal material, and until the distribution and number of types are worked out more clearly, the classification of Indian groups on this basis should not be made an end in itself.

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APPENDIX

MEASUREMENTS (CM.) AND INDICES OF INDIVIDUAL SKULLS¹

Catalog No.	Locality	Age ²	Deformation	Diam. ant. post. max.	Diam. lat. max.	Basion-bregma height	Cranial index	Mean height index	Cranial module
CUPISNIQUE, MALE									
CU 2	Barbacoa	M		17.2	14.8		86.0		
CU 5	do.	Y	Fr.-occ.; asym.	(17.0)	(15.6)	12.9	(91.8)	(79.1)	15.17
CU 7	do.	M	Sl. fr.; med. rt. occ.	(17.3)	(14.5)	13.6	(87.8)	(85.5)	15.13
CU 8	do.	M	Med. fr.; med. rt. occ.	(17.0)	(15.2)	14.0	(89.4)	(87.0)	15.40
CU 10	Santa Ana	M	Sl. lt. occ.	17.0	14.4	13.6	84.7	86.6	15.00
CU 12	Barbacoa	M	Mkd. fr.-occ.	(15.9)	(16.0)	13.7	(100.6)	(85.9)	15.20
CU 13	Santa Ana	O		17.6	14.9	13.6	84.6	83.7	15.37
CU 14	do.	O		17.7	14.0		72.1		
CUPISNIQUE, FEMALE									
CU 1	Barbacoa	Y		17.3	12.9		74.6		
CU 3	do.	M		16.1	14.7	12.9	91.3	83.8	14.57
CU 6	do.	M	Sl. fr.; med. occ.	(15.0)	(13.6)		(90.7)		
CU 9	Santa Ana	M	Med. fr.; med. lt. occ.	(15.2)	(15.6)		(102.6)		
CU 11	Barbacoa	M	Med. fr.; med. occ.	(15.4)	(15.2)	12.4	(93.7)	(81.0)	14.33
MOCHICA, MALE									
M 1	Salamanca	M		17.6	14.8	13.7	84.1	84.6	15.37
M 2	do.	M		18.9	13.9	14.5	73.5	88.4	15.77
M 5	do.	M		17.8	13.4	13.2	75.3	84.6	14.80
M 7	do.	M				14.2			
M 8	do.	M		17.4	13.6		78.2		
M 11	Santa Ana	O		18.8	14.2	14.1	75.5	85.4	15.70
M 12	Ollero	Y		17.7	12.9	13.5	72.9	88.2	14.70
M 13	Pampa de Carrera	M		17.8	13.5		75.8		
M 14	San Ildefonso Viri.	M		16.6	14.0	13.2	84.3	86.3	14.60
M 15	Barbacoa	O		17.2	14.0	13.8	81.4	88.5	15.00
M 16	Salamanca	Y	Sl. asym.	16.2	13.0	13.2	80.2	90.4	14.13
M 19	Barbacoa	Y	Sl. post mortem	(16.6)	(14.0)	13.3	(84.3)	86.9	14.63
M 20	El Brujo	M		18.5	13.1	13.3	70.8	84.2	14.97
MOCHICA, FEMALE									
M 3	Salamanca	Y		15.9	13.7	12.8	86.2	86.5	14.13
M 4	Salamanca	Y		17.4	13.9	12.5	79.9	79.9	14.60
M 6	Barbacoa	M		17.4	13.3	13.0	76.4	84.7	14.57
M 9	Pampa Chicama ³	M		16.6	13.3	12.9	80.1	86.3	14.27
M 10	Santa Ana	M		16.5	12.8	12.6	77.6	86.0	13.97
M 17	Barbacoa	O		17.4	12.9		74.1		
M 18	Barbacoa	O		17.2	13.6		79.1		
M 21	?	M		17.2	13.8?	13.2	80.2	85.2	14.73

¹ For definitions of measurements see Hrdlička, 1939.

² Y=young adult; M=middle age; O=old.

³ Huaca Kidder.

MEASUREMENTS (CM.) AND INDICES OF INDIVIDUAL SKULLS—Con.

Catalog No.	Diam. front. min.	Menton-nasion height	Alv. pt.-nasion height	Diam. biz. max.	Facial index total	Facial index upper	Endo-bas.-nasion	Endo-bas.-sub-nasal pt.	Endo-bas.-prealt. pt.	Facial angle	Alveolar angle
CUPISNIQUE, MALE											
CU 2	9.9										
CU 5	9.9		6.7	(14.1)		(47.5)	10.5	9.6	11.0	67.5°	42.5°
CU 7	8.9		7.4?	(13.9)		(53.2)	10.3	9.0	10.2?	69.5	48.5
CU 8	10.0		6.8	(14.1)		(48.2)	9.8	8.5	9.5	72.0	53.0
CU 10	10.2?	11.0	6.5	14.0	78.6	46.4	9.7	8.6	9.8	70.0	49.0
CU 12	9.5		6.8?				10.4	8.4	10.5	70.0	36.5
CU 13	9.9	11.1?	6.6	13.7	81.0	48.2	9.9	9.0	10.7	65.0	38.5
CU 14	9.1										

CUPISNIQUE, FEMALE											
CU 1	9.1		6.4								
CU 3	9.3		6.2	13.1		47.3	9.4	8.6	10.0	66.5	44.0
CU 6	8.5	10.2	5.9	(12.4)	(82.2)	(47.6)					
CU 9			6.2	13.3		46.6					
CU 11	9.5						8.9				

MOCHICA, MALE											
M 1	9.9		6.8	14.1		48.2	9.6	8.4	9.5	70.0°	53.0°
M 2	9.6		6.5	13.8		47.1	10.5	8.9	9.7	78.0	54.0
M 5	8.5			13.1			10.1	9.2			
M 7	8.6		6.7	13.5		49.6	10.6	9.6	10.3	74.0	64.5
M 8	8.9		6.2	13.2		47.0					
M 11	9.0		6.3?	13.6?		46.3	10.3	8.8	9.9?	75.0	47.5
M 12	9.5		6.3	12.4?		50.8	9.8	9.0	10.1	69.0	50.0
M 13	8.7		6.7	14.0?		47.8					
M 14	9.2		6.4	12.6		50.8	9.4?	8.6	9.7?	68.0	51.0
M 15	9.6		6.8	13.7?		49.6	10.4	9.2	10.7	69.0	38.5
M 16	8.3		6.8				10.0	8.6	9.6	73.0	53.5
M 19			6.5				9.4	8.0	8.9	73.5	54.0
M 20	9.5		6.6	13.3		49.6	9.7	8.5	9.7	70.0	49.0

MOCHICA, FEMALE											
M 3	8.7		6.5	12.7		51.2	9.6	8.5	9.7	69.5	51.0
M 4	8.8		7.1	12.8		55.5	9.9	9.3	10.7	64.0	50.0
M 6	9.3		6.7	13.3		50.4	10.3	9.3	10.6	69.0	48.5
M 9	8.7		6.8	12.6		54.0	9.9	8.6	10.0	69.0	49.0
M 10	9.1						9.1				
M 17	9.4										
M 18	8.9										
M 21	8.7						9.7				

[illegible]

MEASUREMENTS (CM.) AND INDICES OF INDIVIDUAL SKULLS—Conl.

Catalog No.	Orbits: height, right, left	Orbits: breadth, right, left	Orbital index mean	Nose height	Nose breadth, max.	Nasal index	Upper alv. arch, length	Upper alv. arch, breadth	Upper alv. arch, index
MOCHICA, MALE									
M 1.....	3.4 3.4	3.7 3.8	90.7	4.8	2.6	54.2	5.3	6.6	124.5
M 2.....	3.3 3.2	4.1 4.1	79.5	5.2	2.5	43.1	5.3	7.1	134.0
M 5.....	3.2 3.3	3.8 3.7	86.7	4.6	2.2	50.0	-----	-----	-----
M 7.....	3.5 3.5	3.6 3.7	95.9	4.7	2.2	46.8	5.3	6.2	117.0
M 8.....	3.1 3.0	3.5 3.3	89.7	4.5	2.1	46.7	5.7	6.3	116.5
M 11.....	3.4 3.4	3.6 3.6	94.4	4.7	2.5	53.2	5.0	6.4	128.0
M 12.....	3.1 3.2	3.8 3.7	84.0	4.5	2.3	51.1	5.5	6.0?	169.1
M 13.....	3.2 3.1	3.5 3.5	90.0	5.0	2.3	46.0	5.5	6.4	116.4
M 14.....	----- 3.3	----- 3.7	89.2	4.5	-----	-----	5.5	-----	-----
M 15.....	3.5 3.4	3.8 3.8	90.8	5.1	2.4	47.0	-----	-----	-----
M 16.....	3.3	3.7	89.2	5.0	2.3	46.0	5.3	6.0	113.2
M 19.....	3.2	3.6	88.9	4.9	2.4	49.0	5.1	6.8?	133.3
M 20.....	3.1 3.1	3.6 3.6	86.1	4.7	2.4	51.1	5.5	6.4?	116.4

MOCHICA, FEMALE

M 3.....	3.2 3.3	3.7 3.6	89.0	4.5	2.4	53.3	5.2?	-----	-----
M 4.....	3.7 3.6	3.7 3.6	100.0	4.7	2.6	53.3	5.8	6.0	163.4
M 6.....	3.5 3.6	4.2 4.1	85.5	4.7	2.4	51.1	5.5	6.1	110.9
M 9.....	3.4 3.3	3.7 3.8	89.3	4.6	2.1	45.6	5.5	-----	-----
M 10.....	-----	-----	-----	-----	-----	-----	-----	-----	-----
M 17.....	-----	-----	-----	-----	-----	-----	-----	-----	-----
M 18.....	-----	-----	-----	-----	-----	-----	-----	-----	-----
M 21.....	-----	-----	-----	-----	-----	-----	-----	-----	-----



Two views of Cupisnique skull No. 12 from Barbacoa, showing the marked fronto-occipital deformity. (Photographs by Sr. Larco.)



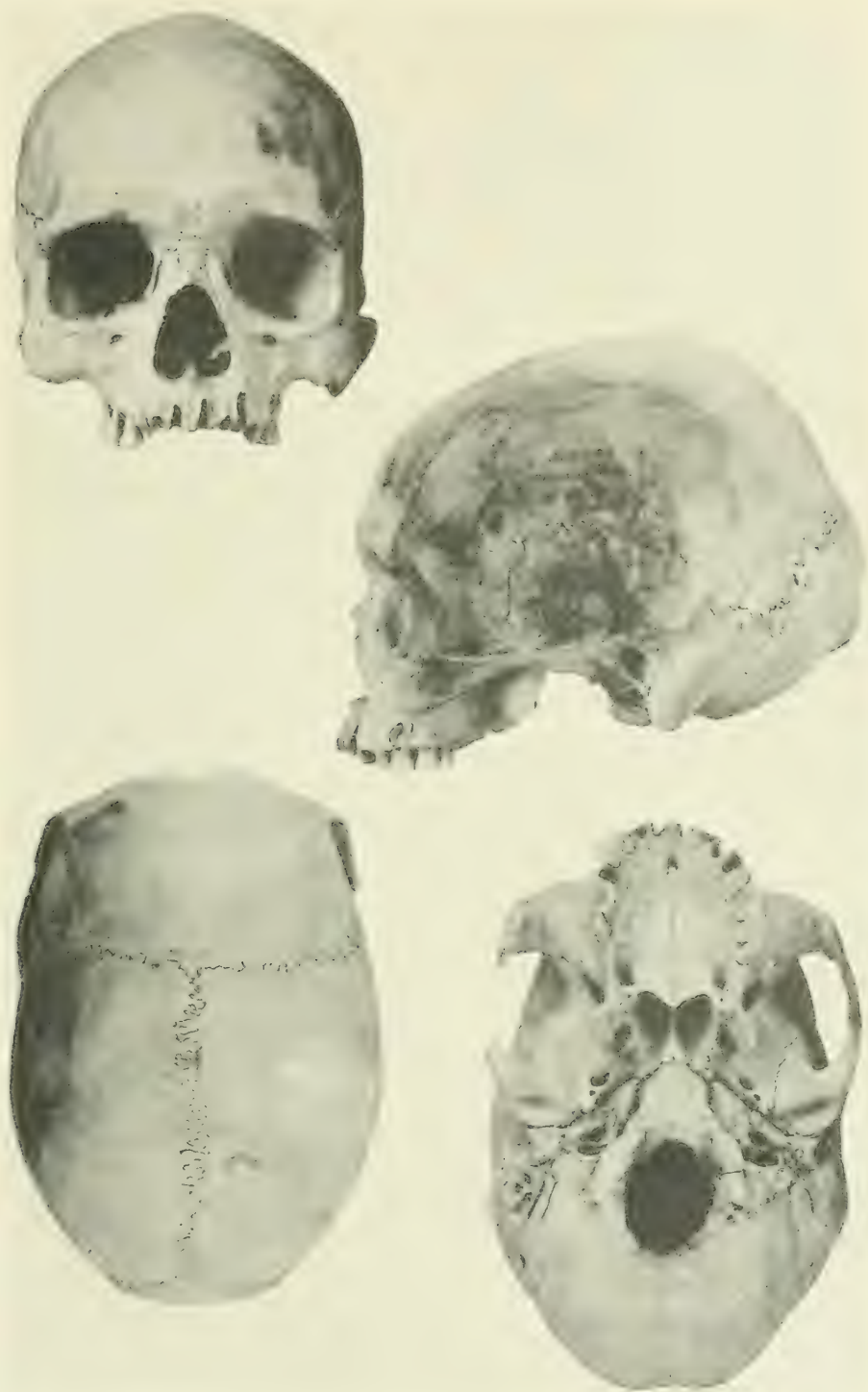
Two views of deformed male skull U. S. N. M. No. 264586 from the Chicama Valley.
Oriented in the Frankfort position.



"Long deformed skulls presumably Proto-Chincha," from Kroeber and Strong, plate 21 (Univ. California Publ. Amer. Archeol. and Ethnol., vol. 21). Reoriented on Frankfort plane.



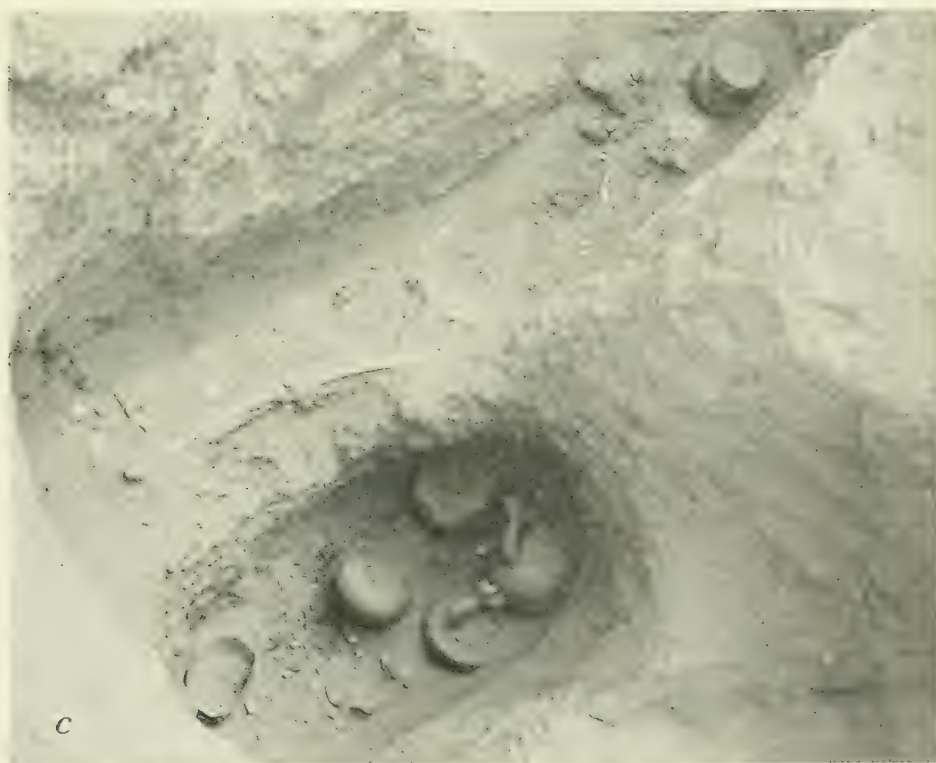
The side and top views of two deformed male skulls from Paracas. Oriented in the Frankfort position. Left, U. S. N. M. No. 379255, from Cabeza Larga; right, U. S. N. M. No. 379254, from Cerro Colorado.



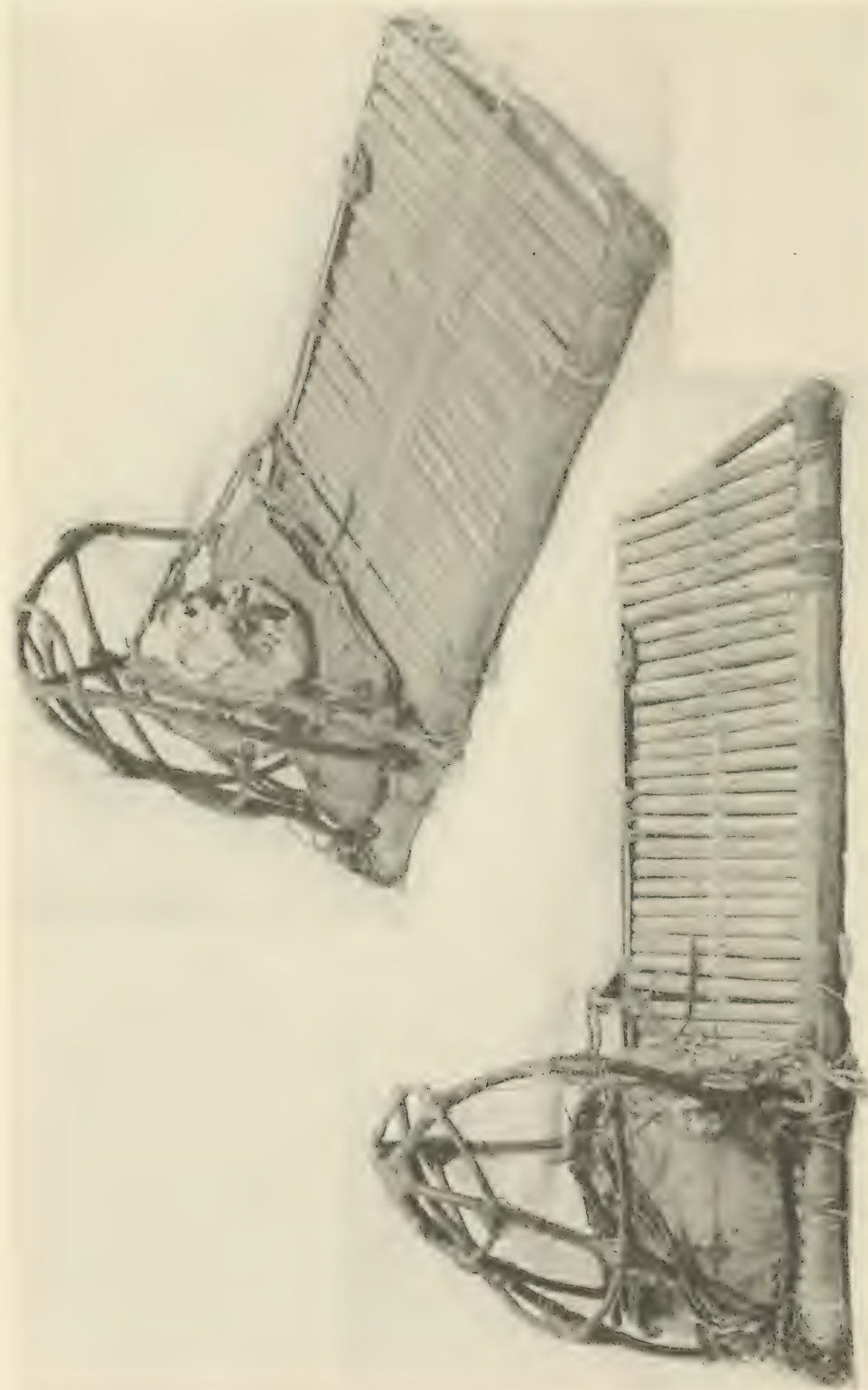
Four views of undeformed male skull U. S. N. M. No. 264482, from the Chicama Valley.
Oriented in the Frankfort position.



Four views of undeformed male (?) skull U. S. N. M. No. 265105, from the Chicama Valley.
Oriented in the Frankfort position.



Three views of typical burials: (a) Flexed Cupisnique burial at Barbacoa; (b) extended Mochica burial at Playa de Salamanca; (c) superposition of Mochica burial over Cupisnique in the cemetery of Santa Ana. (Photographs by Sr. Larco.)



Two views of a Chimú cradle in the collection of the Museo Arqueológico "Rafael Larco Herrera," showing an arrangement of ropes about the pillow and their possible use in deforming the head. (Photographs by Sr. Larco.)



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NEW MARINE MOLLUSKS FROM THE ANTILLEAN REGION

By HARALD A. REHDER

IN THE course of identifying specimens sent in by correspondents of the United States National Museum, I have from time to time recognized forms that could not be assigned to any known species. While making these identifications I have also run across novelties in our collection that seem important enough to warrant their description at the present time.

Sincere thanks are due Dr. Paul Bartsch for his ever-ready assistance and to the following assiduous collectors whose interest and patience have made this paper possible: Dr. B. R. Bales, of Circleville, Ohio; Dr. T. Van Hyning, of Gainesville, Fla.; Maxwell Smith, of Lantana, Fla.; and Ted Bayer, of Gainesville, Fla.

Genus COOPERELLA Carpenter, 1864

COOPERELLA ATLANTICA, new species

PLATE 19, FIGURES 3-4

Shell small, thin, inflated, broadly oval, ends bluntly rounded, translucent whitish, smooth except for growth ridges; beaks slightly anterior and prosogyrate. In the left valve there are three thin divergent cardinal teeth, the central one bifid, while in the right valve there are two thin divergent cardinals; no laterals are present. Ligament external, rather short and broad, posterior to the umbones. Pallial sinus rather broad and reaching beyond the center of the shell.

The type, U.S.N.M. No. 517058, was dredged off Peanut Island, northern Lake Worth, Fla., by Ted Bayer. It measures: Length, 6.5 mm.; height, 4.8 mm.

This, the second known species of *Cooperella*, extends the range of the genus into the Antillean region. It differs from the type, *C. subdiaphana* Carpenter of the west coast, by being smaller, more translucent, and more equilateral.

Genus PITAR Römer, 1857

NANOPITAR, new subgenus

Shell small, suborbicular, externally smooth. Left posterior cardinal thin, high, joined in part to the ligamental nymph, lower part free, curving away and almost reaching end of hinge plate; left middle and anterior cardinals united at top. The right cardinal separate, the middle cardinal rather stout, parallel to the anterior one, posterior cardinal strong, bifid. Pallial sinus moderately deep, rounded. Ventral margin smooth.

Genotype: *Pitar* (*Nanopitar*) *pilula*, new species.

This subgenus differs from the other subgenera of *Pitar* in being smaller and more rounded and in being smooth externally. In the characters of the hinge and pallial sinus it is close to *Calpitar* Jukes-Browne and *Tinctora* Jukes-Browne; from the latter it differs in having a smooth internal ventral margin. From *Calpitar* it differs in having a smooth external surface and in being more orbicular.

PITAR (NANOPITAR) PILULA, new species

PLATE 19, FIGURES 5-10

Shell small, suborbicular, umbones subcentral, rather prominent, prosogyrate, external surface smooth, covered with a thin yellow-brown, deciduous periostracum. An incised line outlines the otherwise undifferentiated broad lunule. Ligament attached to an elongate sunken nymph. In the left valve the posterior cardinal is for the most part confluent with nymph, separating near the lower end and almost reaching the edge of the hinge plate; median tooth slightly broader than the anterior cardinal and joined to it at right angles under the umbo; anterior lateral strong, erect. In right valve the upper anterior lateral is slightly smaller than the lower one, from which it is separated by a pit, which is connected with the first cardinal interspace by a narrow channel at the base of the anterior cardinal; cardinals all separate. Anterior cardinal short, thin, parallel to the slightly broader median cardinal; posterior cardinal elongate, rather broad, bifid. Pallial sinus moderately deep, rounded. Internal ventral margin smooth.

The type, U.S.N.M. No. 517057, measures: Height, 5.9 mm.; length, 6 mm., breadth, 4.2 mm. It was collected by Ted Bayer in Lake Worth, Fla.

Genus *ERVILIA* Turton, 1822

ERVILIA ROSTRATULA, new species

PLATE 19, FIGURES 1-2

Shell small, stout, subtrigonal, rather inflated, white or yellowish, posterior end slightly rostrate, sculpture consisting of strong concentric riblets, crossed posteriorly by fine radial lines. Hinge typically *erviliid*.

The type, U.S.N.M. No. 517059, was collected with several others by Ted Bayer in Lake Worth. It measures: Length, 4.5 mm.; height, 3.3 mm., breadth, 2.3 mm.

This species is closest to the Bermudian *subcancellata* E. A. Smith, differing in being more inflated, more trigonal, and posteriorly rostrate and having the radial sculpture restricted more to the posterior end.

Genus *ASTHENOTHAERUS* Carpenter, 1864

ASTHENOTHAERUS BALESI, new species

PLATE 19, FIGURES 13-14

Shell ovate, thin, grayish white, anterior end rounded, posterior end slightly narrower and truncated, with a ridge running from the median, opisthogyrate umbo to the posteroventral angle. The early portion of the shell is sharply biangulate and evenly concentrically ribbed; in the later portion the concentric ridges become irregular folds, giving the shell a slightly rugose appearance. An elongate calcareous lithodesma, broadly angled in the middle, lies under the umbones in a spongy cartilage. Pallial sinus moderately deep.

The type, U.S.N.M. No. 536052, measures: Length, 10.5 mm., height, 7.6 mm. It was found by Dr. B. R. Bales on Missouri Key, Fla.

This species differs from the only other known West Atlantic species, *A. hemphilli* Dall, in having a more elongate-ovate shape and more central umbones.

Genus *POROMYA* Forbes, 1844

POROMYA ROSTRATA, new species

PLATE 19, FIGURES 11-12

Shell small, inflated, slightly inequivalve, right valve slightly larger and deeper with a more prominent umbo; broadly and irregularly ovate in shape, posteriorly rostrate, the left valve being more rostrate than the right; umbones central. External surface

densely and coarsely granulate, the granules apparently arranged in radial lines. Internally the right valve has a strong cardinal tooth that fits into a socket in the hinge of the left valve, and there is a rather stout internal ligament posterior to the tooth. The ventral margin is radially furrowed in the right valve, smooth in the left; the pallial line is simple.

The type, U.S.N.M. No. 536152, measures: Length, 7.3 mm.; height, 6.4 mm.; breadth, 5 mm. It was dredged in 70 fathoms off Delray Beach, Palm Beach County, Fla.

This differs from *Poromya granulata* Nyst and the other West Atlantic *Poromyas* in its rostrate form and larger, more crowded granules. It occurs from Cape Hatteras, N. C., to Barbados.

Genus CAECUM Fleming, 1813

CAECUM (CAECUM) CAYOSENSE, new species

PLATE 20, FIGURE 9

Shell white, stout, arcuate, ornamented with 14 strong annular ribs of somewhat varying size. The interspaces are of the same widths as the ribs, or wider, and are ornamented with fine axial riblets, which tend to become obscure on the annular ribs. At intervals opaque white axial lines stand out against the ground color of a more glassy white. The septum bears a rather long pointed protuberance at the edge nearest to the convex side of the shell.

The type, U.S.N.M. No. 536045, was collected by Dr. B. R. Bales at Bonefish Key, Florida Keys. It measures: Length, 3.2 mm.; width (at lowest rib), 1.3 mm.

This *Caecum* differs from all the other West Atlantic species in possessing fewer and stronger, more distantly separated ribs.

Genus FARTULUM Carpenter, 1857

FARTULUM NEBULOSUM, new species

PLATE 20, FIGURE 8

Shell small, arcuate, smooth, except for fine growth lines, vinaceous-brown, with irregular, white annular splotches of varying widths, often more or less wavy. Apex constricted, closed with an acuminate septum, the point near and directed toward the concave side of the shell. The aperture is slightly constricted, lip thin, simple. Operculum horny, circular, with many concentric whorls.

The type, U.S.N.M. No. 536042, was collected by Dr. B. R. Bales at Bonefish Key, Florida Keys, and measures: Length, 2 mm., width, 0.6 mm.

This species differs from other Antillean members of this genus in the distinctive color pattern and its broad shape, constricted at both ends.

HALOPSEPHUS,¹ new genus

Shell small, solid, broadly conical, smooth, imperforate. Operculum calcareous, externally convex, sculptured by one whorl of axial, retractively curved, rugose riblets, which begin at the elevated nuclear portion, where they do not reach the margin, and gradually lengthen and reach the margin. Since the tops of these riblets are flush with the convex surface of the operculum, the sculpture has the appearance of curved, radial, vermiculiform grooves, irregular in the center of the operculum.

Type: *Halopsephus pulcher*, new species.

This interesting genus of Turbinidae differs markedly from all other Atlantic groups in its smooth shining surface and in its peculiarly sculptured operculum. It may be near *Taenioturbo* Woodring, 1928 (genotype: *Turbo canaliculatus* Hermann), a question that the knowledge of the operculum of the latter species will help to solve.

HALOPSEPHUS PULCHER, new species

PLATE 20, FIGURES 3, 10

Shell small, solid, broadly conical, of $5\frac{1}{4}$ whorls. Nuclear whorls planate, not sharply differentiated from the postnuclear whorls, with a sharply keeled periphery, the keel bearing broad, horizontally flattened spines, giving the early whorls a stellate appearance when viewed from above; these spines disappear in the early postnuclear whorls. Later whorls convex, smooth, except for some narrow, low, more or less obscure, spiral ridges in the suprapерipheral area, appressed in the sutural region to the preceding whorl. The nuclear whorls are pale scarlet, the later whorls becoming cinnamon-rufous to apricot-orange, lighter on the base. There are irregular radial white maculations running from the suture down over half of the suprapерipheral area, and other white spots of various shapes in numerous spiral rows of different widths over the whole shell; on the periphery and also below the periphery are rows of white maculations, for instance, that resemble Arabic characters. Umbilical region indented but imperforate. Aperture circular, outer lip thin, simple; columellar lip evenly curved, thickened, slightly reflexed. Operculum as in generic diagnosis above.

The type, U.S.N.M. No. 500638, measures: Height, 11.2 mm.; breadth, 11 mm. It was dredged off Lazaretto, Barbados, in shallow

¹ ἀλός, sea + ψῆφος, pebble.

water on rocky bottom by John B. Henderson, Jr., while on the Smithsonian-University of Iowa 1918 Expedition. A second smaller specimen was collected on the same trip off Payne's Bay Church, Barbados, in 50 fathoms on sandy and stony bottom.

Genus ARENE Adams, 1854

ARENE RIISEI, new species

PLATE 19, FIGURES 17-18

1878. *Liotia riisei* Dunker, Poulsen, Catalogue of West-India shells, p. 13 (*nomen nudum*).

1934. *Liotia (Arcne) riisei* JOHNSON, Proc. Boston Soc. Nat. Hist., vol. 40, No. 1, p. 77 (*nomen nudum*).

Shell small, solid, turbinate, white with deep rose splotches and streaks. Whorls $4\frac{3}{4}$, the first $2\frac{1}{4}$ comprising the nucleus, white, smooth, the following whorls sculptured in the following manner: Below the suture are four spiral rows of beads, the second being larger than the others. Below this are four raised knobbed keels with one row of beads between the first and second keel, and two rows of beads between both the second and third, and third and fourth keels. Below the fourth keel are two rows of small beads followed by four rows of rather large beads. Around the umbilicus is a series of large nodules and entering into the deep narrow umbilicus from the columellar edge of the lip are two nodulose cords. In places may be seen fine crowded axial threads, more or less effaced and obscure. The interior of the aperture is ornamental with several elongated denticles.

The type, U.S.N.M. No. 42858, was collected at St. John, Virgin Islands, and may very possibly have come from Mörch. It measures: Height, 4.7 mm.; breadth, 5.2 mm.

This species is very near to *Arcne brasiliiana* Dall, from off Cape Roque, differing, however, in that the spiral nodulose cords are more numerous and the final axial threads less conspicuous.

The name "*Liotia*" *riisei*, generally accredited to Dunker, has appeared on lists for a great number of years but has apparently never been described, a state of affairs I am here remedying.

ARENE VANHYNINGI, new species

PLATE 19, FIGURES 15-16

Shell of medium size for the genus, depressed-conical, the main portion of the upper surface of the whorls yellowish gray, the stout stellate peripheral keel white, and the under surface of the shell grayish white. The nuclear whorls are missing, but the four remaining whorls have a conspicuous sutural canal, and the upper surface of the whorls is obscurely axially rugose, the low broad folds

often knobbed at the edge of the sutural channel. On the early whorls there are some axially directed rose spots, as in *A. cruculata*, but on the later whorls these become straw brown and much reduced. At the periphery is an acute keel, provided with large, regular, anteriorly hollow, triangular spines, which increase in size toward the aperture, giving the shell much the appearance of an *Astraea*. On the periphery, just below this keel, is a narrow spiral cord with regular, small, low, anteriorly hollow scales, and below this is a minutely serrate keel. The channels between these keels are sculptured with fine axial threads. Below the last keel the flattened base is sculptured with four low beaded cords. Two broad cords enter the narrow, deep umbilicus. The slightly expanded circular aperture is thicker externally; interior with a yellowish pearly luster. The operculum is typical, multispiral, concave, the whorls ornamented with crowded, radially elongated, calcareous beads.

The type, U.S.N.M. No. 536054, was collected on Sand Key, 8 miles south of Key West, by G. W. Van Hyning. It measures: Height, 8.7 mm.; breadth, 10.8 mm.

This species is obviously related to *Arauc cruculata* Mühlfeld, but has a different color pattern and the microscopic axial threads are absent. The rugose axial sculpture on the upper surface of the whorls is also less conspicuous and less regular.

MICRODOCHUS,² new genus

Shell very small, broadly ovate-conic; nuclear whorls smooth, post-nuclear whorls convex, finely spirally lirate, somewhat appressed at the suture to the preceding whorl with a consequently rather shallow suture. Umbilicus narrow but distinct, aperture ovate, slightly oblique, outer lip simple, columellar portion slightly reflexed.

Type: *Microdochus floridanus*, new species.

This genus of Rissoiidae seems closest to *Quaba* Adams, 1852, differing markedly from it in being ovate conic and not cylindrical, in having a shallower suture and a more open umbilicus, and in never having axial riblets.

MICRODOCHUS FLORIDANUS, new species

PLATE 20, FIGURE 6

Shell very small, ovate-conic, rather thin, light horn colored. Whorls $4\frac{1}{4}$, nuclear whorls smooth, not marked off from post-nuclear whorls, which are convex and finely and evenly spirally lirate, the sculpture commencing imperceptibly; the whorls are slightly appressed to the preceding whorl at the suture, which is therefore not

² μικρός, minute + δοχός, container.

deep. There is a rather sharp keel around the moderately narrow umbilicus. Aperture ovate, slightly oblique; outer lip simple, columellar portion narrowly reflected and curving gently into the callus on the parietal wall. Operculum thin, ovate, transparent; nucleus excentric.

The type, U.S.N.M. No. 536048, measures: Height, 2.4 mm.; breadth, 1.6 mm., and was collected on Bonefish Key, Florida Keys, by Dr. B. R. Bales.

Genus *RISSEOELLA* Gray, 1847

PHYCODROSUS,³ new subgenus

Differs from *Rissoella* s. s. by being more broadly ovate and in being umbilicated, the umbilicus surrounded by a sharp keel. From *J. freysina* Thiele, 1925, it differs in being more slender and having a narrower keeled umbilicus.

Type: *Rissoella* (*Phycodrosus*) *caribaea*, new species.

This is the first record of the family Rissoellidae from the West Atlantic and also the first species from the tropical Atlantic. I am recognizing *Jeffreysina* as a distinct genus because of its turbinate shape and broad umbilicus.

RISSEOELLA (*PHYCODROSUS*) *CARIBAEA*, new species

PLATE 20, FIGURE 7

Shell minute, broadly ovate, transparently glassy; whorls $4\frac{1}{8}$, convex, suture shallow, surface smooth, except for very fine hairlike, irregularly and distantly spaced, growth lines. Umbilicus narrow, surrounded by a sharp keel. Aperture ovate-semicircular. Outer lip thin, simple; inner lip reflexed at the base, the columellar portion making a straight line with the callus on the parietal wall. Operculum thin, transparent, semicircular, nucleus near the center of the inner edge, surrounded by concentric growth lines. Central radial lamella faintly visible from the exterior.

The type, U.S.N.M. No. 536046, measures: Height, 1.5 mm.; breadth, 1 mm. It was collected by Dr. Bales at Bonefish Key, Fla.

Genus *CREPITACELLA* Guppy, 1867

CREPITACELLA VESTALIS, new species

PLATE 20, FIGURE 13

Shell relatively large, ovate, yellowish white. Nucleus consists of not quite two bulbous glassy whorls. Postnuclear whorls 7, convex, separated by a deep suture, sculptured with axial ribs and slightly

³ φύκος, seaweed + δρόσος, dew.

wavy, spiral striation: the axial ribs are obscurely nodulose at the angulated shoulder of the whorls, which becomes obscure towards the last whorl, the axial ribs tending to evanesce near the periphery. Anal fasciole broad, surrounding a very minute umbilical chink.

The type, U.S.N.M. No. 411896, measures: Height, 10.8 mm.; breadth, 5.3 mm. It was dredged by John B. Henderson, Jr., in 40 fathoms off Ajax Reef, Fla. We possess this species also from Miami to Conch Reef, and Frank Lyman has lately dredged it in 18-35 fathoms off Yamato between West Palm Beach and Fort Lauderdale, Fla.

This shell is broader than the other recent *Crepidacellas*, i. e., *gabbi* Dall, *columbella* Dall, and *leucophlegma* Dall (described as a *Daphnella*), and less strongly shouldered and axially sculptured than *gabbi* Dall. *C. leucophlegma* is not angulate at the shoulder. *Dolophanes* Gabb, 1872, is a synonym of *Crepidacella*.

Genus PERISTICHIA Dall, 1889

PERISTICHIA AGRIA Dall

PLATE 20, FIGURE 4

1889. *Peristichia agria* DALL, Bull. Mus. Comp. Zool., vol. 18, p. 340.

This species has never before been figured, and in lieu of a figure of the type, which is at present unavailable, I have used a specimen collected by Dr. B. R. Bales on Bonefish Key, Fla.: it has also been collected on Key Vaca.

Originally proposed as a genus of dubious affinities, Dall later placed *Peristichia* in the Pyramidellidae near *Oscilla*. Bartsch (Proc. Biol. Soc. Washington, vol. 17, p. 9, Feb. 5, 1904) considered it a subgenus of *Turbonilla*. Thiele, 1929, does not mention it at all, and Wenz (Handb. Paläozool., vol. 6, p. 874, 1940) lists it as a subgenus of *Turbonilla* with a question. An examination shows that it is a pyramidellid close to *Triptychus* and should be accorded full generic rank. It differs from *Triptychus* in having only one basal entrant spiral cord, instead of two, and in lacking columellar folds.

Besides *P. agria* and the type of the genus, *P. torata* Dall, the only other known species is *Iridella pedroana* Dall and Bartsch, 1909, from southern California. *P. agria* differing from it in being more slender, white instead of cinnamon, and with more delicate sculpture.

The West Atlantic form commonly listed as *Oscilla biseriata* Gabb or *nivea* Mörch should be known as *Triptychus nireus* Mörch, 1875. *Oscilla* is a distantly related Japanese group, while *biseriata* Gabb is a probably related species of *Triptychus* from the Pliocene of Costa Rica. The description of this species, by the way, was published in 1881, not 1874 as given in Johnson's list

GLYPHEPITHEMA,⁴ new genus

Shell globose, spire short, whorls smooth, except for subobscure, axial, retractively curved furrows on the upper portion of the penultimate whorls; last whorl flattened below the suture, covered by a thin brownish periostracum, which is strongly wrinkled below the suture. Color pale gray-brown to white, encircled by four narrow bands of deep chestnut spots on a white ground. Umbilicus broad, with a stout funicle. Operculum with a variously shaped nuclear callus, after which comes a broad rib formed by the rather complete fusion of two or three smaller ribs. Between this rib and the outer margin lie several smaller, unequal ribs, the outer ones usually variously sculptured and often joined at the top by a sculptured calcareous deposit roofing over the interspaces.

Genotype: *Natica idiopoma* Pilsbry and Lowe, 1932.

This naticid genus is closest to *Stigmaulax* Mörch, having a rather similar operculum and umbilical region. The operculum does differ, however, and the shell is not strongly sculptured as in *Stigmaulax*. This group has a fossil history parallel to that of *Stigmaulax*, for Woodring (Miocene Mollusks from Bowden, Jamaica, pt. 2, Carnegie Inst. Washington Publ. 385, p. 382, pl. 30, fig. 9, 1928) figures an operculum that undoubtedly belongs to an as yet undiscovered species of this genus occurring in the Miocene of the Antillean region.

Besides the genotype, which occurs from Cape St. Lucas to Panama, this group includes the closely related *G. floridana*, described below, and *Natica turtoni* E. A. Smith from St. Helena. *Natica alapapilionis* Roeding from the Philippines and India also seems to belong here, a fresh specimen from Ilo Ilo agreeing generically in every particular except for a slightly atypical operculum. *Natica broderipiana* Recluz from the Gulf of California to Panamá may also be placed here, although it more strongly sculptured and the operculum is not quite normal. The presence of a Philippine species in this otherwise zoogeographically homogeneous group seems anomalous, and perhaps a study of the radulae and anatomy of the species under discussion may reveal a difference in the Indo-Pacific member.

GLYPHEPITHEMA FLORIDANA, new species

PLATE 19, FIGURES 19-21

Shell globose, stout, last whorl very large, spire small, conical. Nucleus of 2½ whorls sculptured with microscopic spiral lines, the following post-nuclear whorls smooth except for rather deep, retractively slanting, axial grooves, which reach only to the shoulder; post-

⁴ γλῆφω, to carve, engrave+ἐπιθήμα, lid.

nuclear whorls covered with a rather persistent, yellowish-brown periostracum, which is axially wrinkled by parallel ribletlike folds, which are especially strong near the suture, and run to the umbilical region. Four bands of rather regular, distantly spaced, oblong, chestnut spots on a white base surround the last whorl, one each on the shoulder and periphery, and two below the periphery. Between the first and second bands and third and fourth bands there are brown bands, the upper one broader than the lower one; the ground color on the rest of the shell is yellowish white. In the umbilicus is a moderately broad funicle ending in a heavy white callous pad. Aperture semicircular. Operculum with a smooth, somewhat concave, nuclear callus, elevated toward the outer edge (away from the columellar side); this is followed by a broad and then a narrow rounded rib; after a straight-sided, rather wide interspace comes a rib which is joined to the following two thin lamellae at the top by an irregular, calcareous deposit formed of fused radial elements which are swollen over the first thin lamella. At the marginal edge this deposit is pinched up into an irregularly nodulose crest.

The type, U.S.N.M. No. 517060, measures, height, 14.8 mm., breadth, 14.7 mm. It was collected at Peanut Island in Lake Worth, Fla., by Ted Bayer.

Genus OOCORYS Fischer, 1883

OOCORYS BARTSCHI, new species

PLATE 20, FIGURE 16

Shell large, ovate, inflated, pale flesh colored. Nucleus broken and worn but apparently consisting of 1.5 smooth whorls. Post-nuclear whorls 6*, convex, spirally corded, the cords on the later whorls becoming flattened and equidistantly spaced. On the second postnuclear whorl the subsutural area becomes constricted and somewhat appressed to the preceding whorl. In the last two or three whorls this area is slightly concave and sculptured with finer spiral cords. The spiral sculpture is crossed by very fine axial growth lines. Aperture elongate-ovate, oblique, outer lip expanded and reflexed, the reflexed lip made slightly wavy by the ends of the spiral cords, inner lip forming a thin glaze over the parietal wall and a slightly heavier one, with a free edge, on the entire length of the columellar area. Anterior canal rather broad, slightly recurved. Operculum horny, ovate, much smaller than the aperture, with a basal marginal nucleus and many fine concentric growth lines.

The type, U.S.N.M. No. 535689, was dredged in 79 to 140 fathoms south of Tortugas on July 2, 1932, by Dr. W. L. Schmitt. It measures: Height, 111.7 mm.; breadth, 71.7 mm.

This species is more than twice as large as the most closely related species, *Oacorys barbouri* Clench and Aguayo, from off northern Cuba, and is, moreover, more inflated, is without a color band, and has no beaded spiral cord on the shoulder.

A second, slightly smaller specimen, U.S.N.M. No. 417859, came from the Henderson collection and is labeled merely Florida.

PSAROSTOLA,⁵ new genus

Shell small, slender. Nucleus inflated, glassy white, smooth, of $1\frac{1}{2}$ whorls. Sculpture on postnuclear whorls consists of rather narrow ribs crossed by strong spiral cords which form nodules on crossing the ribs. Anterior canal hardly noticeable, siphonal fasciole weak. Aperture narrow; interior of outer lip denticulate, with a moderately narrow sinus below the suture; inner lip smooth.

Type: *Columbella monilifera* Sowerby, West Indies.

This genus is apparently near *Nassarina* Dall and *Cyclivina* Woodring but differs from them in that no attenuation of the base into an anterior canal is noticeable on the outer lip, being more like *Zanassarina* Pilsbry and Lowe, 1932, in this respect; from this it differs in the smaller, more inflated nucleus. *Anachis tineta* Carpenter from Cape San Lucas, Baja California, is apparently a member of this genus.

PSAROSTOLA MONILIFERA SPARSIPUNCTATA, new subspecies

PLATE 20, FIGURE 11

Differs from the typical species in the reduction of the chestnut spotting on the whorls. Instead of the upper three spiral cords being elongately maculated, only the two upper cords are furnished with short spots and alternate axial ribs. Likewise, the spotting is weaker below the periphery on the last whorl. The shell is usually somewhat broader in outline, and the axial ribbing may be a little stronger than in the typical form.

The type, U.S.N.M. No. 450778, measures: Height, 4.9 mm.; breadth, 2.1 mm. It was collected by John B. Henderson, Jr., in 45 fathoms southeast of Fowey Light, Fla., at *Eolis* Station 357. In our collection we have other specimens from the Florida Keys and from the north coast of Cuba.

This subspecies is therefore restricted to the region about the Straits of Florida, while typical *monilifera* we possess from Bermuda, Jamaica, and Haiti.

⁵ $\psi\alpha\acute{o}\sigma$, maculated + $\sigma\tau\omicron\lambda\acute{\eta}$, robe.

BARTSCHIA, new genus

Shell large, solid, elongate-ovate. Nucleus dome-shaped, consisting of $3\frac{1}{4}$ smooth whorls. Postnuclear whorls sculptured with crowded spiral cords crossed by close axial riblets, which give the surface a closely nodulose appearance. Aperture pointed at the posterior angle, and broadly channeled at the anterior end. Anterior canal somewhat recurved. Outer lip internally thickened, the thickening bearing a row of denticles. Columella and parietal wall covered by a smooth callus.

Type: *Bartschia significans*, new species.

This group has recently been assigned to *Metula* by Clench and Aguirre (see below under description of genotype), but it does not belong to that genus. The type of *Metula* H. and A. Adams, 1853, must be *M. clathrata* Adams and Reeve (subsequent designation, Kobelt, Illustr. Conchylienbuch, vol. 1, p. 38, 1876), a Panamic species (see Tomlin, Journ. Conch., vol. 18, No. 6, p. 160, 1927). Woodring now believes that his conclusion as to the type of *Metula* (Carnegie Inst. Washington Publ. 385, p. 286, 1928) was unfortunate and that a tautonymic type designation cannot strictly and validly be maintained. The *Metula* of Woodring (op. cit., p. 285) and other authors is here given the new name *Antemetula* Rehder; genotype: *Buccinum metula* Hinds.

From this group *Bartschia* differs in its larger size and broader aperture, which is not attenuated anteriorly, and in possessing a blunt nucleus. From *Metula* our genus differs in being more fusiform, with a longer spire and shorter, broader aperture not anteriorly attenuated.

It is with much pleasure that I name this striking group for my mentor and colleague, Dr. Paul Bartsch, whose Antillean explorations have so greatly advanced our knowledge of this region.

BARTSCHIA SIGNIFICANS, new species**PLATE 20, FIGURE 17**

Shell large, solid, elongate-ovate. Nucleus bulbous, smooth, of $3\frac{1}{4}$ whorls. Postnuclear whorls about $5\frac{1}{2}$, convex, sculptured by closely spaced spiral cords (8 on the first postnuclear whorl), crossed by regular axial riblets, which gives the first $2\frac{1}{2}$ whorls a latticed appearance; thereafter finer spiral threads begin to be intercalated between the cords until on the last whorl the spiral cords are of irregular varying strength. Color yellowish white, irregularly maculated with varying shades of light chestnut. Last whorl descending but rising again at the aperture where there is a low broad external

varix. Aperture broadly fusiform, pointed above, terminating below into a short broad canal. Outer lip evenly arcuate, internally thickened, the thickening beset with short denticles decreasing anteriorly in size. Parietal wall and columella covered with a smooth callus. Anterior canal short, somewhat recurved, siphonal fasciole indistinct.

The type, U.S.N.M. No. 516493, was dredged by Dr. Paul Bartsch off the Tortugas, Fla. It measures: Height, 54.5 mm.; breadth, 22.3 mm.; height of aperture, 26 mm.

In our collection are three other specimens collected in 75-100 fathoms from south of Key West, off Sand Key.

The only other species of this genus is that described as *Metula agassizi* Clench and Aguayo (Mem. Soc. Cubana Hist. Nat., vol. 15, pp. 179-180, 1941) from off the north coast of Cuba, from which it differs in being stouter, not basally attenuated and in being externally colored, not white. *Metula fusiformis* Clench and Aguayo (loc. cit.), with its different nuclear characters, belongs to another genus.

Genus PUSIA Swainson, 1840

PUSIA HENDERSONI, new species

PLATE 20, FIGURE 12

Shell of medium size, broadly fusiform, rather stout. Nucleus narrowly conical, consisting of 4-4½ whorls, which are straight-sided, smooth, glossy, pale fuscous to straw yellow. Postnuclear whorls (about 7 in the type) convex, sculptured with strong axial ribs, and low, subobsolete spiral ridges. Basically the coloration consists of a narrow subperipheral band of white, above which the whorls are usually pale yellowish white or occasionally darker; below the subperipheral band the whorls are fuscous to vinaceous-brown. The columella bears four plaits, which increase in strength toward the uppermost one. These plaits are continued externally as spiral cords on the moderately long anterior canal. Outer lip simple, internally lirate deep within the aperture.

The type, U.S.N.M. No. 414359, measures: Height, 14.8 mm.; breadth, 6.4 mm. It was dredged in 30 fathoms off Bears Cut, Miami, Fla. There are numerous other lots in the collection from Miami to Sand Key, near Key West, Fla.

This species varies slightly in coloration as mentioned above and in the strength of the spiral sculpture; it may also be more slender.

It is closest to *Pusia cubana* Aguayo and Rehder, but the whorls are more convex and the spire is more elongate and straight-sided: *P. cubana* is strictly bicolored and there is never a subperipheral band noticeable.

Other Antillean species that belong in *Pusia* are the genotype *P. sulcata* Gmelin (= *microzonias* Lamarck), *histris* Reeve, *trophonia* Dall, and *albocincta* C. B. Adams. Three other West Indies species that belong here, but have stronger spiral sculpture, are *P. pulchella* Reeve, *variata* Reeve, and *dermestina* Lamarck.

PUSIA EPIPHANEA, new species

PLATE 20, FIGURE 14

Shell in general similar to *P. hendersoni* but larger (apex broken, but 9 postnuclear whorls remaining), with spiral sculpture somewhat more obsolete and the subperipheral white band more conspicuous; below the band the shell is chocolate-brown and above the white band the color is chocolate-brown between the axial ribs, fading to pinkish on the ribs and becoming yellow just below the suture; on the penultimate whorls the color is in general fainter.

The type, U.S.N.M. No. 414278, measures: Height, 23.7 mm.; breadth, 9 mm. It was dredged in 15 fathoms off Tortugas, Fla., by John B. Henderson, Jr.

Genus PUSIOLINA Cossman, 1921

This group, proposed as a substitute for *Pusiola* Monterosato, 1917, not Wallengren, 1863, with the type *tricolor* Gmelin from the Mediterranean, was considered by Monterosato to be a genus distinct from *Pusia*. Thiele, however (Handb. Syst. Weichtierk., vol. 1, p. 337, 1929), gave it only sectional value under *Pusia*. An examination of the nuclear whorls of these two groups forces us to accept Monterosato's dictum and *Pusiola* with its bulbous nucleus of one to one and a half whorls must be restored to generic rank, distinct from *Pusia*, which has a narrowly conical, straight-sided nucleus of about four whorls. *Mitra hanteyi* Dohrn and *gemmata* Stowrby from the Caribbean region may be placed here, agreeing in general character with the genotype but having four columellar folds instead of three. Until the radular characters are elucidated these species had better not be separated solely on the difference in the number of folds. Here we may also place the following new species.

PUSIOLINA ARESTA, new species

PLATE 20, FIGURE 1

Shell rather large for the genus, narrowly ovate. Nucleus bulbous, consisting of $1\frac{3}{4}$ convex whorls, the first $1\frac{1}{2}$ whorls brown, the last half gradually becoming glassy gray. The following $5\frac{3}{4}$ whorls slightly convex, subsuturally somewhat flattened, distantly axially ribbed, and only very obscurely axially grooved. Color straw

yellow or darker, with a peripheral band of white more or less obscurely and narrowly margined above and below with chestnut, and with dark chestnut maculations between the ribs. Columella bearing four plaits which are continued as cords on the short anterior canal: above these cords are one or two obscure, slightly nodulose ones.

The type, U.S.N.M. No. 517056, measures: Height, 10 mm., breadth, 4.7 mm. It was collected in 3-6 fathoms at Santa Rosa on the north coast of Pinar del Río, Cuba, during the *Thomas Barrera Expedition*. Three paratypes were collected at the same place, and one specimen was found at La Esperanza, Pinar Del Río, Cuba.

Genus FENIMOREA Bartsch, 1934

FENIMOREA MOSERI BRUNNESCENS, new subspecies

PLATE 20, FIGURE 5

Similar in shape and nature of axial and spiral sculpture to typical *Fenimorea moseri* (Dall) from the lower west coast of Florida, but of a uniform light vinaceous-cinnamon color (Ridgway's Color Standards), except for the two glassy white nuclear whorls.

Type, U.S.N.M. No. 517055, measures: Height, 23 mm.; breadth, 8.4 mm. It was dredged in 14 fathoms off Fort Walton, Okaloosa County, Fla., by Maxwell Smith.

This is an interesting race from the coast of the "panhandle" of Florida, a conchologically little-known region.

Genus CRASSISPIRA Swainson, 1840

CRASSISPIRA (CRASSISPIRELLA) MESOLEUCA, new species

PLATE 20, FIGURE 15

Shell solid, elongate-ovate, with a narrowly conic spire. Nucleus low, rounded, of almost 2 smooth whorls. Postnuclear whorls axially ribbed, the ribs crossed by spiral cords, which on the later whorls become slightly nodulose and whitish where they cross the axial ribs; fine threadlike striae are found in the spaces between the stronger spiral cords and between the shoulder of the whorls, where the axial ribs end, and the suture: in this space there is also a rather strong subsutural keel. The color is usually of varying shades of chestnut, becoming occasionally almost blackish and rarely yellow; the ends of the ribs at the shoulder are decidedly whitish and the subsutural area may be lighter in color. Aperture narrow, outer lip with a deep sinus between the subsutural keel and the shoulder. Anterior channel rather broad and rather shallow; a trace of a stromboid notch is evident. Basal fasciole weak, closely spirally corded.

The type, U. S. N. M. No. 411906, was collected by John B. Henderson, Jr., on Looe Key Reef, Fla., and measures: Height, 16.6 mm.; breadth, 6.6 mm. Specimens in our collection show that this species is restricted, as far as is known, to the lower Florida keys, from Biscayne Bay to the Tortugas.

This species is distinguished from the other Antillean members of this group by its broader form, shorter spire, and distinctive white spotting of the upper part of the axial ribs.

Genus *PYRGOCYTHARA* Woodring, 1928

PYRGOCYTHARA FILOSA, new species

PLATE 20, FIGURE 2.

Shell rather small, elongate-ovate, solid. Nucleus dark brown, globose, $1\frac{1}{2}$ whorls, the first $1\frac{1}{4}$ whorls smooth, the following $1\frac{1}{4}$ whorl with fine, closely spaced, axial riblets. The postnuclear whorls are strongly axially ribbed (10 on the penultimate whorl), the ribs strongly angled at the shoulder; in the early whorls a spiral cord occurs on the shoulder, and there are several below; on the last two whorls these spiral cords increase in number but at the same time become obscure. Color brown except for a rather broad, spiral, yellowish white band on the shoulder of the whorls. Aperture somewhat narrow; outer lip internally thickened under the varixlike axial rib, posterior sinus broad, as is the anterior channel. Interior brownish in color.

The type, U.S.N.M. No. 27637, measures: Height, 6.5 mm., breadth, 2.8 mm. It was collected by Henry Hemphill at Marco, Fla. There is one paratype from the same lot.

This species differs from the only other described recent species of *Pyrgocythara* (*P. hemphilli* Bartsch and Rehder, 1939) in being smaller and in having a different color pattern.



NEW ANTILLEAN MOLLUSKS.

1, 2, *Ervilia rostratula*; 3, 4, *Cooperella atlantica*; 5-10, *Pitar (Nanopitar) pilula* (9, 10: hinge); 11, 12, *Poromya rostrata*; 13, 14, *Asthenothaerus balesi*; 15, 16, *Arene vanhyningi*; 17, 18, *Arene riisei*; 19-21, *Glypheidium floridana*.



NEW ANTILLEAN MOLLUSKS

Pusiolina aresta; 2, *Pyrgocythara filosa*; 3, *Halopsephus pulcher*; 4, *Peristichia agria* Dall;
 5, *Fenimorea moseri brunnescens*; 6, *Microdochus floridanus*; 7, *Rissoella* (*Phycodrosus*)
caribaea; 8, *Fartulum nebulosum*; 9, *Caecum* (*Caecum*) *cayosense*; 10, *Halopsephus pulcher*
 (operculum); 11, *Psarostola monilifera sparsipunctata*; 12, *Pusia hendersoni*; 13, *Crepi-*
lacella vestalis; 14, *Pusia epiphanea*; 15, *Crassispira* (*Crassispirella*) *mesoleuca*; 16, *Oocorys*
bartschii; 17, *Bartschia significans*.



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No. 3162

A NEW PEST OF ALBIZZIA IN THE DISTRICT OF COLUMBIA (LEPIDOPTERA: GLYPHIPTERYGIDAE)

By J. F. GATES CLARKE

During the summer of 1940, L. G. Baumhofer, late associate entomologist, division of forest insect investigations, U. S. Bureau of Entomology and Plant Quarantine, submitted a small series of moths, together with larvae and pupae of a species attacking the ornamental "mimosa" (*Albizzia julibrissin* Durazzini) in the northwestern part of the District of Columbia. More recent observations have indicated an extension in the distribution of the insect northeastward beyond the limits of the District of Columbia into adjacent Takoma Park and Silver Spring, Md. Both foliage and flowers of the "mimosa" are sometimes severely damaged.

Although the moth is evidently a glyphipterygid, it could not be identified as any known species of the American fauna or as referable to any American genus. During the midsummer of 1941, I made further collections and field studies, and with the help of August Busck it was possible to trace the species to the Australian genus *Homadaula* Lower.¹ As there were no examples of the genus in the National collection, a request was sent to Norman B. Tindale, of the South Australian Museum, Adelaide, South Australia, for specimens of the genotype. These were made available through the courtesy of Herbert M. Hale, director of the South Australian Museum. The moths from *Albizzia* proved to be specifically distinct but obviously congeneric with *lasiochroa*. They may represent a species described under some other genus in the family Hyponomeutidae (where Meyrick placed *Homadaula*), but no description or figure that fits them has been found. The species is obviously an exotic one, probably

¹ The genus *Homadaula* is generally credited to Meyrick (1907), but it was first published by Lower (1899) with *lasiochroa* Lower as the only included species.

introduced from the Indo-Australian region, and, since it appears to be new, I am offering a description.

The structural diagnoses of the larva and pupa were prepared by Carl Heinrich; the photographs were made by M. L. Foubert, of the Office of Information, and the drawings by Arthur D. Cushman, of the Bureau of Entomology and Plant Quarantine, all of the United States Department of Agriculture.

HOMADAULA ALBIZZIAE, new species

PLATES 21-25, FIGURES 1-21

Antenna, palpus, head, thorax, and forewing and cilia mouse gray with a silvery luster, the scales tipped with pale cinereous. Forewing sparsely irrorated with conspicuous black spots. Hind wing fuscous; cilia gray with a light fuscous basal band. Forelegs and midlegs blackish fuscous strongly overlaid with cinereous, tarsi annulated with cinereous; hind leg shining luteous, overlaid with gray. Abdomen gray above, luteous beneath.

Eighth tergite strongly modified to form a close-fitting hood. Distal end broadly bifurcate, each point with a cluster of stiff setae. Eighth sternite greatly reduced, fleshy, ridgelike, and closely involved with the vinculum.

Male genitalia.—Harpe (fig. 16) very slender, with a large subquadrate costal expansion, rather profusely covered with fine setae; cucullus narrow, bluntly pointed. Anellus (fig. 13) strongly fused with bases of the harpes, with a small, slender, digitate process from each dorsolateral corner, each process bearing several stout setae at distal end. Aedeagus (figs. 6a, 14) stout, strongly constricted basally, forming a small bulbous process; distal end strongly sclerotized, compressed and curved as a cupped, bifurcate process. Vinculum (fig. 15) a broad U-shaped band. Tegumen with lateral edges broadly expanded, then abruptly narrowed anteriorly. Gnathos (fig. 12) arising from the narrow anterior edge of the tegumen in the form of two curved bars, one of these originating slightly to the left of the middle as a narrow, inverted S-shaped bar dilated at the distal end, the other arising from the right side as a broad, inwardly curved bar, its distal end also dilated. Alimentary canal opening distally between these two elements of the gnathos. Uncus (fig. 11) very broad, with a deep excavation on each side of middle distally.

Female genitalia (fig. 17).—Ostium opening at the end of a long, attenuated, curved tube, the latter emerging from a membranous pocket and curved toward the left. Ductus bursae membranous and entering the duct connecting the bursa copulatrix and receptaculum seminalis well before the bursa. Bursa copulatrix elongate oval; signa 2 lightly sclerotized, elongate plates, situated in the posterior

part of the bursa. Inception of ductus seminalis between entrance of ductus bursae and receptaculum seminalis.

Alar expanse 13 to 17 mm.

Type.—U. S. N. M. No. 56277.

Type locality.—Washington, D. C.

Food plant.—*Albizzia julibrissin* Durazzini.

Described from male type and nine male and female paratypes, all from the type locality (August and September dates).

DESCRIPTION OF LARVA

Length 14 to 16 mm. Head and prothoracic shield testaceous, strongly marked with dark brown to black in the form of irregular longitudinal bands. Thoracic segments always gray to blackish brown, frequently darker than the abdominal segments, and with five longitudinal white stripes. Thoracic legs shining, dark brown to black; joints narrowly annulated with white. Abdominal segments pale gray to blackish brown, with five longitudinal white stripes. The dark ground color of the segments sometimes strongly suffused with rose or pink, especially when the larva is full-fed, and occasionally broken with white patches, giving a mottled effect. Anal plate dark brown mottled with white. Tubercles and spiracles dark brown to black.

STRUCTURAL CHARACTERS

PLATE 25, FIGURES 19-21

Head and body with only the normal primary setae.

Head, viewed from above, as long as wide; widest part well behind middle; adfrontal sutures extending to incision of dorsal hind margin; frons reaching to middle of dorsum; longitudinal ridge almost as long as frons; setae A^1 , A^2 , and P^1 lying in a straight line; A^1 and A^2 closer together than A^2 and A^3 ; A^2 and A^3 and L^1 well separated (A^3 almost equidistant from A^2 and L^1) and lying in a nearly straight line; setae Adf^1 , P^1 and P^2 also lying in a straight line. Ocelli all present; 3, 4, and 5 lying in a line and very close together.

Prothoracic shield extended laterally to include the prespiracular setae. These setae three in number and situated in a line along the lateral margin of the shield; IV and V closely approximate and near the anterior lateral angle of the shield, III well back of the other two. Setae IV and V closely approximate and under the spiracle on abdominal segments 1 to 6 inclusive, slightly separated on abdominal segment 7, and well separated and lying in a longitudinal line on abdominal segment 8; seta V very short on all the abdominal segments. On the ninth abdominal segment seta I well separated from II and III, anterolaterad of II; IV and V approximate but not on a single pinaculum. VI well separated from IV and V. Crochets

38 to 40, irregularly biordinal and arranged in a complete circle. No anal fork.

PUPA

PLATE 23, FIGURES 7-9

Pupa small (5 to 6 mm.), moderately slender, tapering appreciably from abdominal segments 7 to 10; caudal end rounded; cremaster absent; abdominal segments 3 to 7 each with a low, postmedian, transverse, somewhat scalloped ridge on middorsum; a transverse row of fine, short spines near anterior margin on dorsum of each of abdominal segments 4 to 8, and a girdle of short, rather well-spaced setae encircling the posterior margins of each of abdominal segments 4 to 7; on each side and near the anterior end of the long slitlike anal opening, a small, strongly sclerotized, flangelike projection, partially covering a short, stout seta.

At the time of writing many pupae are on hand. This is the stage in which this species overwinters. The life cycle during the summer is short (22 days), and from the data already gathered it seems likely that there are at least two, possibly three or more, complete life cycles annually.

The eggs are laid either on the leaves or flowers, the latter usually being attacked first, and flowering trees definitely being preferred to nonflowering ones. The larvae are at first gregarious, living together in a heavy web spun throughout the affected parts of the plant. As the larvae grow they spread out to various parts of the trees, tying the leaves together in large, conspicuous masses. The leaflets, sometimes little else being eaten, are then skeletonized, which causes them to die, turn brown, and become detached at the rhachis. The leaflets may remain on the tree, however, owing to the heavy webs by which they are tied.

When the larvae are full-fed they drop to the ground on long silken threads. The threads are so numerous that one has the sensation of walking through spider webs when passing beneath an infested tree. After dropping to the ground the larvae crawl to nearby objects and spin cocoons in cracks and crevices, beneath the edges of the siding of houses, on the bark of adjacent trees or, rarely, between leaves of the host plant.

Note

Since the above was written (Jan. 1942) careful search in Virginia has been made as far as 10 miles south of Petersburg and east to Williamsburg. No evidence of the presence of the moth has been found in Virginia. North of the District of Columbia, in Montgomery County, Md., however, the species is much more abundant and widespread than previously. Many trees in Takoma Park were practically defoliated by the insect during the summer of 1942.

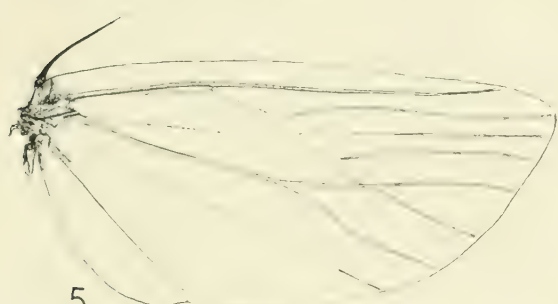


1. Adult male of *Homadaula albizziae*.

2. Normal, uninfested leaves of *Albizzia julibrissin* Durazzini.



3. Typical example of infested inflorescence with infestation beginning to spread to leaves.
 4. Infested leaves with fruits involved. Note complete destruction of leaves and detached leaflets in lower part of photograph.



5



7



6



9

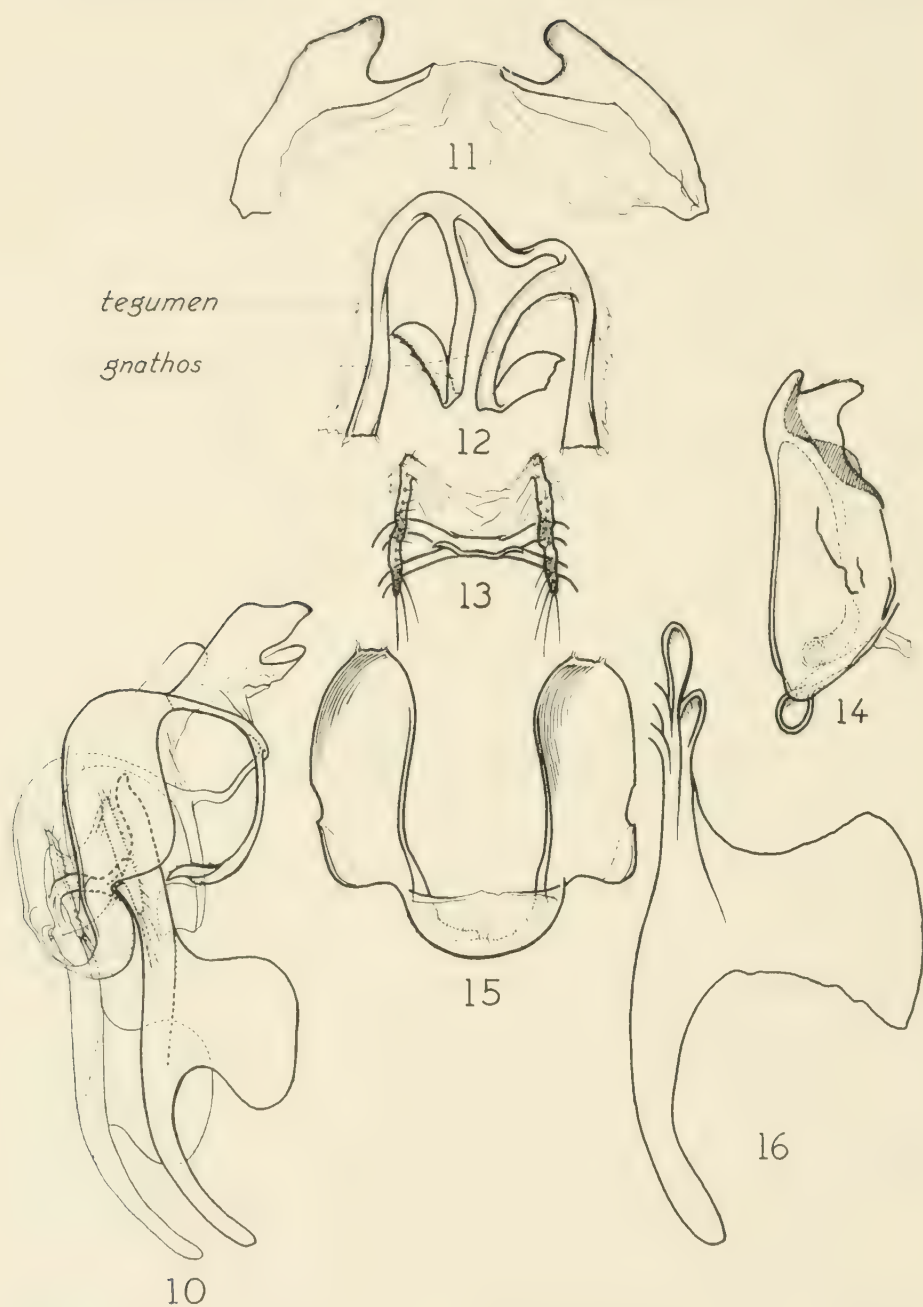


6a

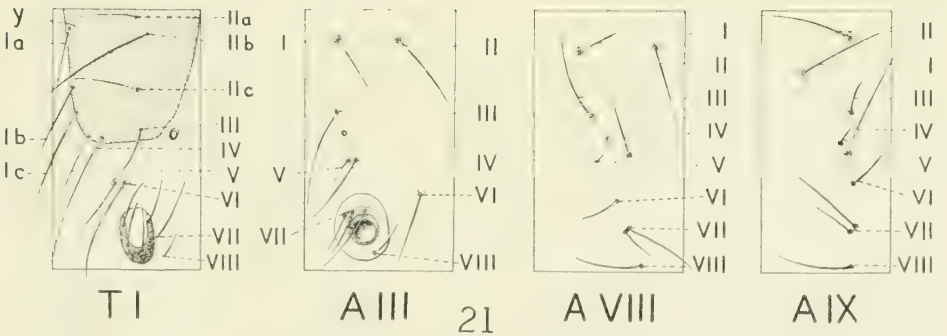
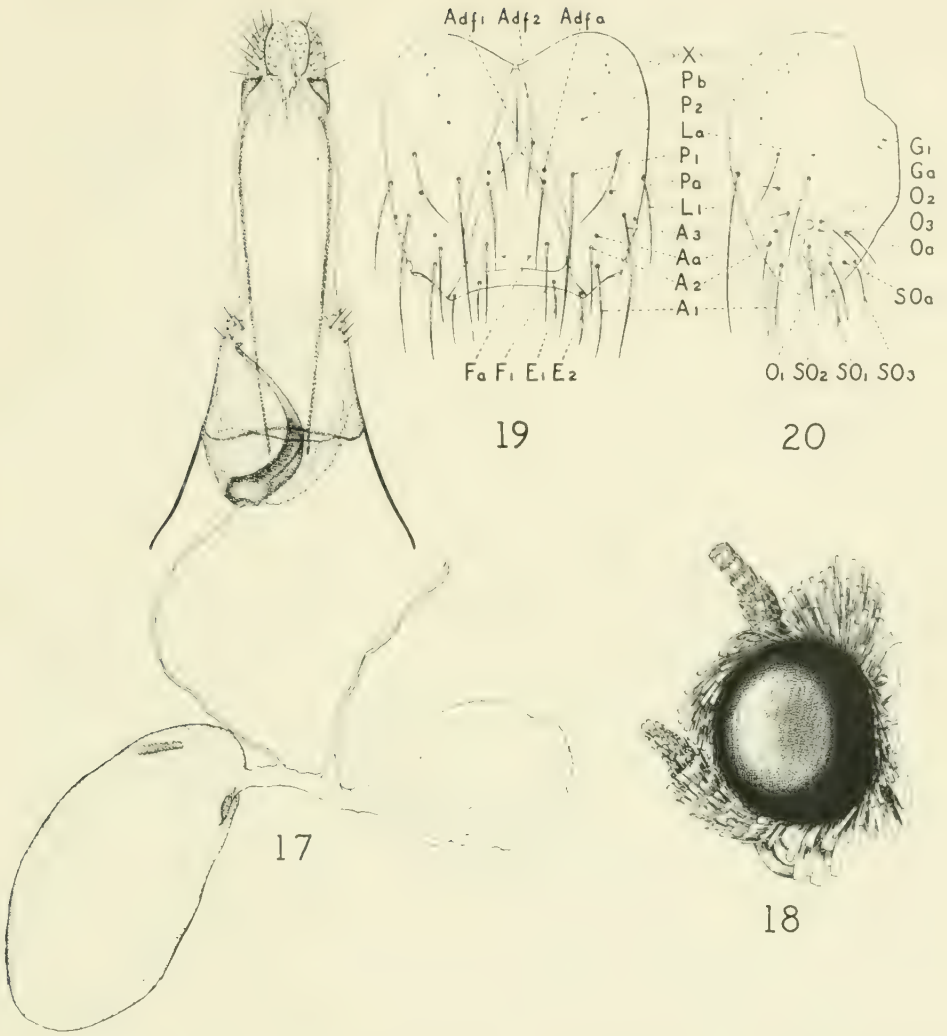


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5. Wing venation of moth.
 6-6a. 6, Ventral view of eighth tergite and male genitalia with aedeagus removed; 6a, lateral aspect of aedeagus.
 7. Lateral view of pupa.
 8. Ventral view of pupa.
 9. Dorsal view of detail of fourth abdominal segment of pupa.



10-16. Male genitalia of moth dissected, flattened, and shown in diagram: 10, Lateral view with aedeagus removed; 11, uncus; 12, tegumen and elements of gnathos; 13, anellus; 14, aedeagus; 15, vinculum; 16, harpe.



17. Ventral aspect of female genitalia.
18. Lateral view of head of moth.
19. Dorsal view of head capsule of larva.
20. Lateral view of head capsule of larva.
21. Setal maps of body segments of larva.



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OSTEOLOGY OF UPPER CRETACEOUS LIZARDS FROM UTAH, WITH A DESCRIPTION OF A NEW SPECIES

By CHARLES W. GILMORE

IN A preliminary paper ¹ the new genus and species *Paraglyphanodon utahensis* was briefly characterized. It is now proposed to give a more complete description of the type specimen and to describe a second species found in the collection made in 1940 by a Smithsonian paleontological expedition under the leadership of Dr. C. L. Gazin. The illustrations were all drawn by Sydney Prentice.

Suborder SAURIA

Family POLYGLYPHIANODONTIDAE Gilmore

Genus PARAGLYPHANODON Gilmore

Paraglyphanodon GILMORE, Smithsonian Misc. Coll., vol. 99, No. 6, p. 3, 1940.

Etymology.—παρά, beside + γλύφᾶνος, chisel + ὀδούς, tooth.

Genotype.—*Paraglyphanodon utahensis* Gilmore.

Diagnosis.—Dentition subacrodont, heterodont; teeth short, stout, with sharp lateral and transverse cutting edges; anterior teeth reduced, with transversely compressed crowns; vertebrae procoelous; no evidence of zygosphenes-zygantrum articulation; size of animal small.

Relationships.—On the basis of the dentition *Paraglyphanodon* seems to have its nearest affinities with its contemporary *Polyglyphanodon*.² Such relationship is suggested by the general plan of the dental series: (1) Similarity of crown structure; (2) presence of a

¹ Smithsonian Misc. Coll., vol. 99, No. 6, p. 3, 1940.

² Gilmore, Charles W., Smithsonian Misc. Coll., vol. 99, No. 16, p. 1, fig. 1, 1940.

much-reduced last molar; (3) widening of the intermediate teeth with sharp transverse cutting edges; (4) progressive reduction of anterior teeth to those having simple crowns. In view of these suggested affinities, the present genus is tentatively assigned to the family Polyglyphanodontidae.³

Attention is called to the possibility that *Coniosaurus crassus*,⁴ from the Cretaceous Chalk of Sussex, England, may eventually find a resting place in this same family. This suggestion is made on the basis of its small size, reduced posterior molar, a tendency of intermediate teeth to widen transversely, and a reduction in size of the anterior teeth.

PARAGLYPHANODON UTAHENSIS Gilmore

Type.—U.S.N.M. No. 15668, consisting of a jaw bone containing 8 posterior teeth. In the original description it was identified as a left maxillary, but in the light of new materials it quite certainly repre-

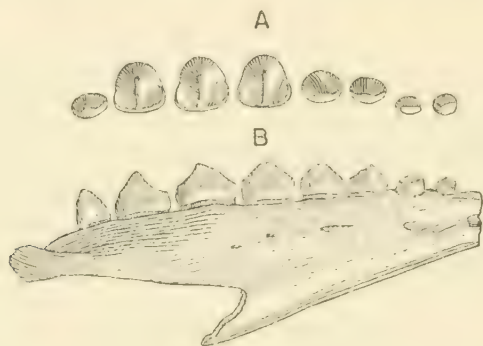


FIGURE 6.—Right dentary of *Paraglyphanodon utahensis* Gilmore: A, Superior view of dentition; B, lateral view of the dentary. $\times 5$. U.S.N.M. No. 15668 (type). (After Gilmore.)

sents a right dentary. This specimen was found in the lower part of the North Horn formation, Upper Cretaceous, in close proximity to the paratype of *Polyglyphanodon sternbergi* (U.S.N.M. No. 15816).

Description.—The anterior end of the type dentary is missing, but the lost part left its impression on the small block of matrix in which it is preserved, and this impression gives evidence that there were probably 11 teeth in the complete dentary series. These occupied a space 11.5 mm. long. The teeth increase in size from front to back, with a much-reduced posterior tooth as in *Polyglyphanodon*. The teeth are subacrodont, anchylosed to the sides of shallow alveolar depressions.

Viewed laterally the teeth are short and stout, with subacute, equilateral, triangular crowns, the apex being centrally placed (see fig. 6, B). Viewed from above, however, the heterodont nature of the teeth (fig. 6,

³ Gilmore, Charles W., Proc. U. S. Nat. Mus., vol. 92, p. 229, 1942.

⁴ Owen, R., A monograph of the fossil Reptilia of the Cretaceous formations, pt. I, p. 21, pl. 9, figs. 13–15, 1851. Paleontographical Society, London.

A) is at once evident. The anterior teeth have transversely compressed crowns that swell inward at the base. The fourth tooth from the front of the present series has an incipient vertical ridge developed on the inner side of the crown that divides this face into two unequal parts, the posterior being the larger. The three teeth that follow, the fifth, sixth, and seventh, widen abruptly transversely and display a sharp transverse cutting edge that extends inward at right angles to the outer cutting edge. This transverse edge is at a slightly lower level than the apex of the outer side. The smooth, sharp transverse edge strongly suggests a functional use similar to that of *Polyglyphanodon*. The last tooth of the series is much reduced in size, the fore and aft and transverse diameters being about half the dimensions of those of the preceding tooth. It also retains a reduced inner cutting edge, shown clearly in specimen U.S.N.M. No. 15876. The bases of the crowns of practically all the teeth swell out and then contract sharply to the roots.

PARAGLYPHANODON GAZINI, new species

Type.—U.S.N.M. No. 16580, consisting of an imperfect skull, articulated with the lower jaws, upper and lower teeth, associated with short sections of articulated vertebrae, and fragmentary ribs. Collected in 1940.

Locality.—South Dragon, "lizard locality," Manti National Forest, Emery County, Utah.

Horizon.—North Horn formation, Upper Cretaceous.

Description.—The specimen selected as the type of this species was collected from the same level and in association with specimens of *Polyglyphanodon sternbergi* and *Paraglyphanodon utahensis*. The poorly preserved skull has been worked out in relief on a small block of matrix, and fragmentary though it may be it gives the first information of the cranial structure of *Paraglyphanodon*. The skull consists of the incomplete parietofrontal region, the right postorbital, impression in the matrix of the right jugal, and the imperfect left maxillary and the alveolar border of the right. There are four teeth in the left maxillary and fragments of two in the right maxillary. The left ramus, which has been fully freed from the matrix, carries a series of six posterior teeth but lacks the tip. The anterior half of the right dentary is missing, but the posterior portion bears five teeth. The right quadrate is preserved in situ, as shown in figure 7.

At this time its larger size and the differences found in the dentition distinguish this new species from its contemporary, *P. utahensis*.

The preservation in the matrix of much of the profile of the right side provided sufficient evidence for the reconstruction illustrated in fig. 7. The anterior maxillary portion and the anterior half of the

dentary were drawn from the elements of the left side. The form and size of the orbit are clearly outlined in the matrix, although all the surface bone of the jugal, lachrymal, and prefrontal is missing. The diminutive size of *Paraglyphanodon gazini* is well illustrated by the skull, which has an estimated length over all of 26 mm.

Viewed from above, the parietal minus the posterior processes, the right frontal, small portion of the left, and part of the right postfrontal are present in their natural relationships. The coalescence of all sutures except those joining the nasal bones renders it impossible clearly to delimit these separate elements. The premaxillary region is missing.

The parietal has the usual quadrangular outline, with an undulating superior surface that appears to be perforated by a pineal foramen near its junction with the frontals. Whether this foramen lies wholly within the parietal or whether it is bisected by the frontoparietal suture

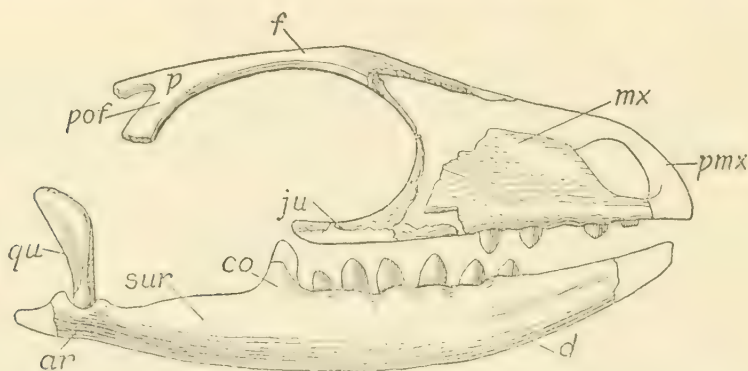


FIGURE 7.—Skull and lower jaw of *Paraglyphanodon gazini* viewed from the right side: *ar*, Articular; *co*, coronoid; *d*, dentary; *f*, frontal; *ju*, jugal; *mx*, maxillary; *p*, parietal; *pmx*, premaxillary; *pof*, postfrontal; *qu*, quadrate; *sur*, surangular. $\times 3$. U.S.N.M. No. 16580 (type).

cannot be determined from available materials. On the posterior border of the parietal the upper surface is excavated, thus forming a narrow transverse shelf that is divided into two halves by a raised longitudinal ridge at the center. Between the supratemporal fossae the parietal has a least transverse diameter of 7.5 mm.

The frontals are paired. On the superior outer edge of each frontal a low, raised, longitudinal ridge extends the greater length of the bone.

A portion of the right postfrontal is preserved in the type, but the coalescence of the sutures makes it impossible to determine its manner of junction with the parietal and frontal.

The right quadrate is preserved in articulation with the ramus as shown in figure 7, but its poor preservation renders all structural details obscure.

The mandible is represented by the posterior half of the right ramus and the nearly complete left ramus. This ramus has been freed from the matrix, and although it gives a good idea of the jaw as a whole the complete coalescence of sutures makes it impossible to determine the detailed structure of the jaw.

The dentition is represented by 15 teeth, 6 posterior teeth in the left ramus, 4 in the right ramus, 3 in the left maxilla, and 2 in the remnant of the right maxilla. Comparison of upper and lower teeth fails to disclose differences that would distinguish one from the other (see figs. 8 and 9).



FIGURE 8.—Posterior teeth of left dentary of *Paraglyphanodon gazini*, crown view. Most posterior tooth on the right. $\times 5$. U.S.N.M. No. 16580 (type).

In the general plan of the subacrodont dentition the teeth of *Paraglyphanodon gazini* follow those of the genotype in having the anterior teeth reduced and having a small tooth at the posterior end of the series; also there is a similarity in cusp pattern of the larger teeth, in having a sharp transverse cutting edge with an outer cutting edge at right angles to it, though they differ much in other details.

At the present time it is upon characters found in the lower dentition that reliance is placed for distinguishing the present specimen from the type of *Paraglyphanodon utahensis*. The more important of these differences are as follows: Crowns of larger teeth wider transversely



FIGURE 9.—Teeth of left maxillary of *Paraglyphanodon gazini*, crown view. Small tooth in front. $\times 5$. U.S.N.M. No. 16580 (type).

and narrower anteroposteriorly, with a relatively longer transverse cutting edge; posterior tooth with a well-developed cusp on the inner side; enumerated from the posterior end of the series, the second and third are subequal in size with a reduced fourth, whereas in *P. utahensis* the second, third, and fourth are subequal with a much reduced fifth tooth. Crowns of fourth and fifth subequal in size, with well-developed transverse cutting edge whereas in *P. utahensis* the crown of the fifth tooth is about half the size of the fourth and both have incipient inner cusps; the crown of the sixth tooth is more robust than *P. utahensis*. The teeth throughout the series are larger and more widely spaced. The six posterior teeth in the left ramus occupy a longitudinal space of 8.6 mm.

Vertebrae.—Associated with the skull of specimen U.S.N.M. No. 16580 are 12 vertebrae, in three series of 3, 4, and 5 articulated vertebrae, respectively. The series of five (fig. 10, A) evidently pertains to the dorsal series, as evidenced by the parts of ribs found in association. All the vertebrae are procoelous, with depressed centra. The centra are rounded from side to side on the median ventral surface. On each side of this median rounded portion the surface is traversed by shallow, longitudinal depressions. The ball is set off by a faint annular groove. The character of the articulations for the ribs cannot be determined.



FIGURE 10.—Vertebrae of *Paraglyphanodon gazini*: A, Ventral view of dorsal vertebrae; B, lateral view of anterior thoracic or cervical vertebrae. $\times 2\frac{1}{2}$. U.S.N.M. No. 16580 (type).

from the available materials. The five articulated vertebrae illustrated in figure 10, A, have a combined length of 19.4 mm.

A second section of the backbone of this same individual is shown in figure 10, B. These vertebrae are considerably shorter than the dorsals described previously, and it is assumed they pertain either to the anterior dorsal or the posterior cervical series. The zygapophyses are wide apart, with articular faces nearly flat. The border between anterior and posterior zygapophyses is shallowly incised by a wide, open notch. Spine short, rectangular, without transverse enlargement of its top.

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THE BIRDS OF SOUTHERN VERACRUZ, MEXICO

By ALEXANDER WETMORE

THE present account relates to the birds found in the Canton of the Tuxtlas, in southern Veracruz, and is based on collections and studies made in 1939 and 1940. It includes also some additional data obtained at Tlacotalpam nearby, with other information from El Conejo, located* about midway between Tlacotalpam and Alvarado, among the sandhills that extend along the coast. Most of the observations were made near the village of Tres Zapotes, around the camp of the National Geographic Society-Smithsonian Institution Archeological Expedition to Veracruz, which was occupied here in extended excavations under the leadership of Matthew W. Stirling, chief of the Bureau of American Ethnology of the Smithsonian Institution (see map, p. 217).

In brief, my personal work in 1939 covered the period from March 5 to April 16. The following year other duties prevented my return, but the collections and observations were continued by M. A. Carriker, Jr., who was in the field from January 13 to May 21, 1940. Our records seem fairly complete for the area that we covered, though no tropical region can be completely known without years of study. Our notes cover 291 forms of birds that were certainly identified.

The investigations were carried on in 1939 under permits granted through the cooperation of Señor Juan Zinser, then Jefe del Servicio de Caza, Departamento Forestal y de Caza y Pesca, and in 1940 from the succeeding director of this service, Señor Salvador Guerrero. We are indebted deeply to General Alejandro Manje, Comandante of the 26^a Zona Militar en Veracruz, for the authorizations

allowing the bearing of arms for hunting, and for other courtesies. Thanks are due many friends in Mexico for assistance in a variety of matters.

Previous biological work in this general region had been decidedly limited, most of the studies relating to the region farther to the north between the city of Veracruz and the great volcano of Orizaba. Occasional specimens of birds have been recorded from Alvarado and Tlacotalpam, but these were few until 1894, when E. W. Nelson and E. A. Goldman, of the Biological Survey, made a general reconnaissance that covered a part of the section. Their observations were made principally near Tlacotalpam on April 21 and 22 and May 17 to 29, and at Catemaco from April 26 to May 5. From San Andrés Tuxtla, May 11 to 13, they made an excursion into the Sierra de Tuxtla, ascending to the summit of Volcán San Martín. From May 14 to 16 they were at Santiago Tuxtla. They were occupied principally with mammals, birds being collected mainly at Tlacotalpam and Catemaco. Their specimens have been studied in preparing this report and, in a number of instances, have afforded interesting comparative data with our own notes of the present day.

In 1900 and 1901 Percy W. Shufeldt and A. E. Colburn made a collection of birds at Paso Nuevo, Buena Vista, and La Buenaventura, considerably higher up on the Río San Juan. Part of their specimens are in the United States National Museum, while others went to the Museum of Comparative Zoölogy, the American Museum of Natural History, and elsewhere. The region they covered lies actually outside the limits of the present paper, but specimens from their collections have been among the most useful available for comparison.

ITINERARY

On March 5, 1939, the work covered in this report had its beginning when, in company with Richard H. Stewart, staff photographer of the National Geographic Society, I left the city of Veracruz by train for Alvarado, a town situated among the low, brush-grown sandhills, evidently ancient dunes, that for miles to the south extend along the coast. At Alvarado we transferred to the launch *Eustolita*, which carried us across the Bay of Alvarado and up the Río Papaloapan to the fine old town of Tlacotalpam (pl. 26, fig. 1). This place is located on an open plain of slight elevation, with many shallow ponds and grassy marshes interspersed with thickets and low trees and broad areas of open savanna. The following morning, in the small launch or canoa *La Delfinita*, we continued up the river, crossing almost immediately by a narrow channel choked with waterhyacinth that cut across to the Río San Juan, and then by other channels into that branch of the San Juan Delta known as the Río San Agustín.

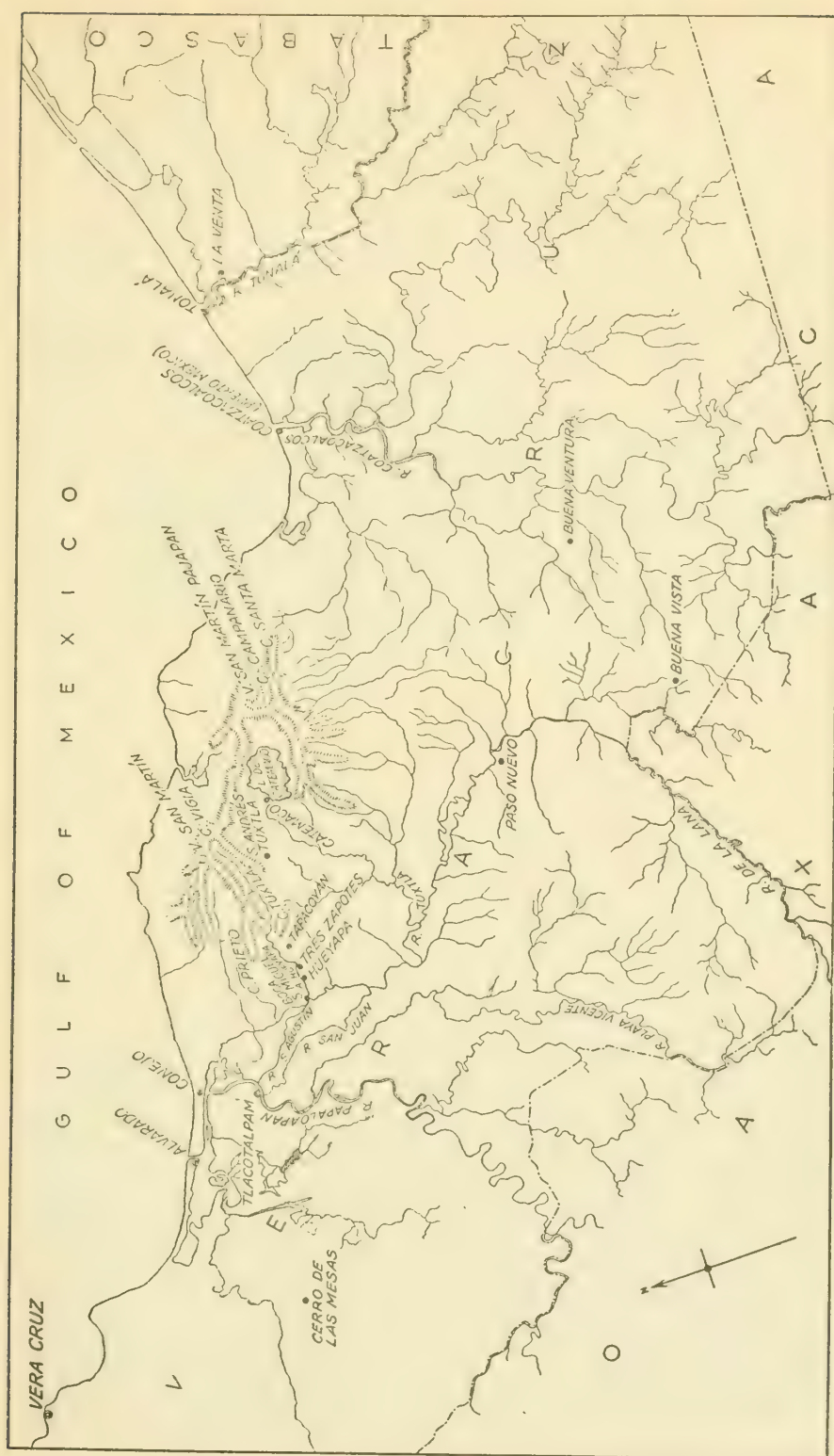


FIGURE 11.—Sketch map of southern Veracruz and western Tabasco to show the region covered in the present report. Scale approximately 25 miles to the inch.

For the first half of our journey the land was low and marshy, with connecting channels between the larger streams. Far to the south we could see the outline of the Sierra de Tuxtla, while to the north, dimly, appeared the great bulk of Orizaba. At La Candera the land became higher, and extensive forest of fair-sized trees appeared. After five hours' travel we reached the head of navigation at Boca San Miguel (pl. 26, fig. 2). Tide influence in the stream extended to this point. The stream here had fairly high banks with the elevation at the little palm-thatch houses that marked the place at about 40 feet above sea level. Here our outfit was transferred to an oxcart, while we rode mules for the 2-hour journey to camp, a mile beyond the village of Tres Zapotes.

The location was as ideal for the biologist as for the archeologist. The three palm-thatch houses of the camp were placed on slightly elevated ground, with the mounds marking the activities of the ancient inhabitants spread on all sides. The land is slightly undulating and is cut by the winding course of the Arroyo Hueyapa, a stream of clear water that comes down to the river at the Boca. From our houses we looked out across the open pastures of a small savanna to the Cerro de Tuxtla, with the low slopes of Cerro Prieto and the higher Volcán San Martín in the distance. Dense jungle began beside us and extended for miles, except where considerable tracts had been cleared and planted in corn by the villagers. These *milpas* are cultivated for four or five years until the tough-rooted grass finally gets the upper hand. They are then abandoned (pl. 27, fig. 1) and new clearings are made in the adjacent jungle. The old fields produce heavy stands of grass that are burned somewhat casually in the dry season but gradually grow up in bushes, which little by little form thickets and in the end are covered by second-growth forest. This ecological cycle, judged from the archeological evidence, has continued here for centuries, possibly for 2,000 years or more, with steady shift and change of plant and animal life in accommodation to the agricultural activities of man. The general elevation is less than 200 feet above sea level, with the land rising in rolling hills toward the Sierra de Tuxtla and becoming lower toward Hueyapa and the river.

Rainfall is heavy, with a limited dry season beginning in March and extending through the month of May. During our stay cold storms of rain and wind (*nortes*) swept down periodically from the north until the beginning of the dry season, flooding the lowlands with water, with the thermometer dropping regularly to 50° F. Even in the heat of the dry season the nights usually were cool.

Near Tres Zapotes village there are several small lakes and marshy channels (pl. 28, fig. 2). Laguna Larga begins adjacent to the houses and extends for some distance behind a low ridge, beyond which is



1. Low shore line of the Río Papaloapan, at Tlacotalpam. March 5, 1939.



2. The somewhat elevated bank of the Río San Agustín at Boca San Miguel. April 15, 1939.



1. Abandoned fields or milpas grown with scrub that will eventually become second-growth forest. Tres Zapotes. March 25, 1939.



2. Primitive forest along the Arroyo Corredor, near Tres Zapotes. April 4, 1939.

Laguna del Tular, and still farther away is the Arroyo Tepanaguasapan whose black waters run sluggishly through broad areas of dark, swampy forest to come down finally into the marshy savanna area called Para Madera that extends to the river. Other lakes and marshes are found near Hueyapa.

Beyond, toward the Sierra de Tuxtla, I worked on the low hills called Cerro Chico Zapote and Cerro Nestepe, which were covered with gallery forest, where I found relatively few birds. East and north of camp lay the Arroyo del Sitio and various other smaller branches of the Hueyapa running through jungle and milpas. To the northwest at the Arroyo Corredor was a great tract of heavy forest with much undergrowth (pl. 27, fig. 2).

The region was one of abundant birds that came to the very door of the little palm-thatched house that Richard Stewart and I had built to contain a dark room for the photographer and to serve as laboratory for the ornithologist. In the beginning, with Ramón Galloso as assistant, I worked on foot through the whole region adjacent to camp, and then used riding mules to reach more distant sections, traveling along narrow trails where the arroyo crossings seemed bottomless in sticky mud. These early morning rides afield, affording me opportunity to watch from the elevation of the saddle the small birds in the trailside bushes or the spiraling flocks of great hawks as they moved slowly northward in migration, while the harsh calls of dozens of chachalacas came on every hand, are among the happy memories of this work in Mexico. At the end of March, with appreciably lessened rainfall, the trails became hard, with disappearance of the sticky mud that had filled them previously, and at times the midday sun became hot and oppressive.

We closed the camp on April 15 and traveled that day as far as Tlacotalpan, continuing on April 16 to Alvarado and Veracruz.

Other duties prevented my own return the following season, but arrangement was made for M. A. Carriker, Jr., well known for his extensive work over wide areas in Latin America, to continue the investigations. Mr. Carriker arrived at the camp near Tres Zapotes on January 14, 1941. The weather early this season was bad, with one *norte* following another, considerable rain, and temperatures ranging from 50° F. to 60° F. Carriker was occupied with work in this area until January 31, when he returned to Tlacotalpan to secure a needed series of birds in that vicinity. The avifauna there is quite different from that of Tres Zapotes, owing to the absence of heavy forest. The higher, drier land is found principally near the Río Papaloapan, and is in the main planted in sugarcane, in whose fields birds are few. The scanty woodland consists of thorn scrub found inland near the extensive ponds and lagoons, with tracts of marshy meadow

between these thickets and the water. Marshy areas too wet for cultivation are used as pastures. Under these conditions, the number of land birds, aside from passing migrants, is not large, but aquatic species abound. Among these there are numerous species that are not listed in the accompanying report, as no extensive collection of them was made, so in this group there are many additions to be made to our list.

Work continued here until February 20 and included visits by launch on February 10 and 12 to El Conejo about midway between Tlacotalpam and Alvarado, and a little more than an hour's run from the first-mentioned of these two places. Here, Carriker investigated the low, broken range of hills that has a width of about a mile and an average height of 300 feet, and that extends for miles along the coast below Alvarado. These hills resemble ancient sand dunes and seem originally to have been covered with low woodland, some of which still remains in scattered areas. Extensive sections have been cleared and are now covered with short, thick grass used for pasture. Birds were abundant here, though the number of species was not great. The western mockingbird (*Mimus polyglottos leucopterus*) was common, *Icterus prothemelas* was more abundant than elsewhere, and here Carriker found the Inca dove (*Scardafella inca*).

On February 21 he returned to Tres Zapotes. The weather in the meanwhile had moderated, with the dry season coming early. Until May, rain fell once in late February and again on April 10, in great contrast to conditions I had encountered the previous year. The rainy season began again at an early date, being initiated with a tremendous downpour on May 7. Between March 11 and April 3, Carriker made eight trips to the Cerro de Tuxtla (pl. 28, fig. 1), going in by way of Tapacoyan Arriba on the west flank of the mountain. These were one-day expeditions, and the birds secured were prepared at the main camp. Early in May he located for 8 days in Tapacoyan.

The Sierra de Tuxtla ends at the southwest in the Cerro de Tuxtla, which rises abruptly to about 4,000 feet elevation. There are few outlying foothills on the west and south, though low, broken hills lie between Tres Zapotes and the base of the peak. The whole of the western and southern slopes of the cerro is covered with a luxuriant growth of almost virgin forest, with clearings up to 800 feet elevation. On the eastern face most of the original forest has been cut and the slopes are now in pasture. Only where the descent is precipitous does forest remain. The region to the east and southeast is hilly and broken. Two peaks form the summit. The area on this mountain lying above 2,000 feet altitude is limited and is composed of narrow, steep-sided ridges, along whose summits the trees

were low, stunted, and gnarled, often covered with epiphytes. Elsewhere, the forest was beautifully luxuriant, with tall, spreading trees. In many areas, ordinary undergrowth was scant, but a small thorny palm, the chocha, was abundant. There are few trails in the forest, and water above Tapacoyan is scarce. Birds, aside from *Veniliornis fumigatus sanguinolentus*, *Henicorhina leucosticta prosthleuca*, and *Basiluterus culicivorus culicivorus*, were not abundant in the higher areas. Many of the common lowland species were not observed.

To collect on Volcán San Martín, Carriker left Tres Zapotes on April 14, going by way of Tapacoyan, Potreros, Santiago de Tuxtla, Buena Vista, and San Andrés Tuxtla. The following morning at 9:30 he reached a solitary house on the volcano at a place called El Tular, at 2,125 feet elevation. From here a mule trail, obscured by many old logging roads, led to 3,550 feet on the mountain. Carriker made his base at El Tular, where a clear, cool stream of water emerges from a subterranean channel in the upper end of a small valley and flows to the southwest. According to Carriker's notes, while the slopes below El Tular are intensely cultivated, above there extends a magnificent forest, unbroken by clearings, with many huge, tall trees and luxuriant undergrowth in which the thorn-covered chocha palm, so abundant on Cerro de Tuxtla, is happily absent. The slopes are gentle to 3,500 feet, with many extensive flats. The soil is decomposed volcanic ash overlying coarser deposits of the same material. Above El Tular he found only one trickle of water, which runs over volcanic rock in a deep ravine at the place called La Cocina, where the mule trail ends. As is often the case in such situations, the abundant rainfall in the main goes into the ground to reappear far below.

The ascent from La Cocina to the summit, over a narrow path along a narrow ridge, is in places steep but may be made in about an hour by an experienced climber. The mountain according to Carriker's barometer rises to about 5,500 feet. Dense forest comes up the cone of the volcano to within a few hundred feet of the rim of the crater, while trees of reduced size continue to the edge where they become gnarled and twisted and are covered with moss. From the edge of this woodland a tangle of tough, almost impenetrable shrubbery extends down into the crater, where it changes to forest growth of imposing proportions.

The trail emerges at the highest point on the volcano at the middle of the southern side, this side being much higher than the northern part of the rim. From this elevation, there is a grand view across the summit to the lowlands on the north, and to the sea on the east. To the south much of the view is obscured because of the configuration

of the land. The crater is approximately $1\frac{1}{4}$ miles across from east to west, and about a mile in the opposite direction. Carriker thought the depth to be about 800 feet, and noted two small vents, with minor cones and craters, rising from the floor. These were forest covered. One small area on the main crater floor, of perhaps 10 acres, was almost bare of vegetation, having only a few scattered trees. Collecting here continued until April 22.

On the return journey to Tres Zapotes, Carriker crossed from Santiago de Tuxtla to Lirios instead of making the long circuit to Tapacoyan. The trail though rocky and broken in places was easily practicable in the dry season, but probably not feasible during the rains.

On May 13 Carriker returned to Tlacotalpam and made another visit to El Conejo on May 15; he collected near the town on May 16 and 17, when field work for the season came to an end.

PHYSIOGRAPHY AND LIFE ZONES

Except for limited areas, the region covered in this report lies in the Humid Division of the Tropical Life Zone. At Tlacotalpam the land is almost at sea level (pl. 26, fig. 1), the effect of tide is felt in the rivers, and there are extensive swamps. Near Tres Zapotes the terrain becomes slightly undulating, with an average elevation of about 200 feet, rising steadily with more broken aspect toward the Sierra de Tuxtla (pl. 28, fig. 1). This range has four main peaks, the highest being Volcán San Martín. According to an account by Immanuel Friedlaender,¹ San Martín rises to 4,600 feet (1,400 meters), but Carriker's barometer readings showed about 5,500 feet. The Cerro de Tuxtla (called by Friedlaender C. Santiago) is about 4,000 feet (1,200 meters), and Cerro Prieto (Mono Blanco of Friedlaender) about 3,800 feet (1,150 meters). The Cerro Vigía, a spur of San Martín, is about 4,100 feet. (The difference in names for these individual mountains is due apparently to local usage, as Friedlaender worked from San Andrés Tuxtla at the east, while our contacts were with people living to the west and north.)

The Arid Division of the Tropical Zone surrounds the humid lowland area of the Tuxtla region, with savannas cutting in irregularly on the forests around their borders. According to the manuscript notes of E. W. Nelson in the files of the Fish and Wildlife Service, arid conditions come in south of the Tuxtla range at the western side of Lake Catemaco, where the low hills and valleys are dry, with sparse, woody vegetation.

¹ Über das Vulkangebiet von San Martin Tuxtla in Mexiko. *Zeitschr. für Vulkanologie*, vol. 7, No. 3, Nov., 1923, pp. 162-173, pls. 17-24.



1. A distant view of Cerro de Tuxtla from the village of Tres Zapotes. April 13, 1939.



2. A typical lagoon with aquatic vegetation and a background of swampy forest, near Tres Zapotes. April 11, 1939.

Across the higher sections of Cerro de Tuxtla and Volcán San Martín there is a small area that belongs with the Subtropical Zone, though these elevated portions are too small in total extent to support an extensive avifauna characteristic of this higher zone. The Subtropical element here must be considered a remnant or fragment from the cooler climatic conditions of the Pleistocene, preserved at its present rather low elevation through the fact of the extensive cloud banks with accompanying rains that cover the mountain peaks for much of the time with the modification of temperature that they bring. The northern location of the mountain mass between latitudes 18° and 19° N. must also be considered a contributing factor in this preservation, as also must its isolation by lowlands and the consequent full exposure of the higher slopes to cold winds. The list of birds that may be considered as of Subtropical affinity is as follows:

Oreopeleia lawrencii carrikeri
Campylopterus hemileucurus hemileucurus
Pampa pampa excellens
Aulocorhynchus prasinus prasinus
Lepidocolaptes affinis affinis
Xenicopsoides montanus variegaticeps
Empidonax flavescens imperturbatus
Turdus assimilis leucauchen
Myadestes unicolor unicolor
Catharus mexicanus mexicanus
Myioborus miniatus molochinus
Basileuterus culicivorus culicivorus
Basileuterus belli scitulus
Piranga leucoptera leucoptera
Chlorospingus ophthalmicus ophthalmicus
Atlapetes apertus

From a survey of the complete list of these mountain birds, the impression comes to me that the Subtropical elements, here near the northern limit of their latitudinal range, tend to descend lower than in the mountains of Central America, either regularly or casually, so that the demarcation of the Subtropical area from the Tropical Zone is less distinct than usual. This is reasonable when we consider that we are here in the northern sector of the Tropical area and that those elements of a subtropical nature that are found are undoubtedly affected by the prolonged period of heavy rains, which bring lowered temperatures, and by the constant sweep of cold storms from the north from November to the end of March, the "northers" of the Texas plains, in Mexico called *nortes*. Some species of the higher-zone element in the Sierra de Tuxtla range down to between 2,000 and 3,000 feet elevation, though in Central America to the south the same types of birds occur only at much higher levels. In the section on migration in the present paper, it is remarked that stragglers of such high-

mountain birds as *Basileuterus culicivorus culicivorus* and *Chlorospingus ophthalmicus ophthalmicus* in winter come casually in the heavier forests around Tres Zapotes at only 200 feet above sea level.

Our exploration of the avifauna of this fascinating region covered only the northern part of the mountain mass of which the Sierra de Tuxtla forms the northwestern bulwark, and that not completely, since we did not collect on the Cerro Prieto, except near its base, or on the Cerro Vigia. To the south of Catemaco there is another group of higher peaks called on some maps the Sierra San Juan and on others the Sierra de Acajucan. These include a Cerro Santa Marta and the steep-sided cone of the Cerro Campanario, which is said to be a little higher than Volcán San Martín. The farther peak, on the side toward Puerto México, is called San Martín de Pajapan and must not be confused with the other San Martín covered in this report. This second mountain has at its southeast base the town of Pajapan and is distant only about 40 kilometers from Puerto México. The biological exploration of this part of the region still remains to be made before our knowledge is complete.

The entire elevated area of the Tuxtlas, lying at the northern end of the great Isthmus of Tehuantepec, is of volcanic nature and is found at the southeastern end of the great arc of extensive recent volcanic activity that begins in Tepic and extends through Toluca and Orizaba. While available maps may not be wholly accurate in detail, the isolation of the Tuxtla area by extensive lowlands from the plateau of central Mexico is easily evident through study of the drainage. The abundant rainfall is carried off by streams that descend the Tuxtla highland on all sides, often with abrupt waterfalls interrupting their upper courses. The San Juan and Papaloapan Rivers flow around it on the west and southwest, reaching the sea at Alvarado, while on the southeast it is bounded by the Río Coatzacoalcos and its tributaries, the waters from which enter the sea at Coatzacoalcos (Puerto México). To the east is the Gulf of Mexico.

In modern times the Volcán San Martín has been reported active in 1662 and again in 1793. Of the latter eruption we have a detailed account in a manuscript report made by José Mariano Moziño, a botanist who was in the area at the time.² Earth tremors and thunderous subterranean noises began on March 2, 1793, and continued for two days, with smoke from the volcano. A second, more violent eruption came on May 22 and continued at intervals with considerable

² His notes have been published or reprinted in several places. See Informe de Don José Moziño sobre la erupción del Volcán de San Martín, Tuxtla (Vera Cruz) ocurrido en el año de 1793. Bol. Soc. Geogr. Estadística Rep. Mex., vol. 2, 1870, pp. 62-70; and Descripción del Volcán de Tuxtla por D. Joseph Mariano Moziño Suarez de Figueroa, botánico naturalista de la Real expedición de Nueva España y de las límites al Norte de California. La Naturaleza, Periodico Cient. Soc. Mex. Hist. Nat., vol. 3, 1874, 1875, and 1876, pp. 106-114.

force until September, gradually then dying down. Moziño visited the crater on two occasions, on September 23 and November 21. He describes the two smaller, inner craters that Carriker observed, and the great amount of ash over the mountain slopes, but his only remark concerning the effect of the volcanic action on the life of the area is that at the end of June the eruptions had destroyed the forest cover on the mountain along the trail to Tecolapan for a distance of 10 leagues, leaving only burned trunks of trees.

Francisco Zérega,³ who visited the crater of San Martín in August 1859, reports that the smaller cones in the bottom were covered with vegetation even to the openings in their summits, where trees 15 to 20 feet tall were growing. He was told, however, that in 1828 this plant growth was not present.

Because of the recent volcanic activity in these mountains, it has been supposed that there was no probability of any peculiarity in the fauna, but such proves not to be the case. The two eruptions recorded in historic times on San Martín had lava flows that broke out to the north, but there does not appear to have been major disturbance elsewhere except through the fall of volcanic ash. Friedlaender, in his visit of January and February 1922, noted the same condition of stunted trees on the crater rim of San Martín that Carriker reported in 1940, and he was told that the extreme upper slopes had been bare until 1900, the growth having appeared since then. In this, however, he was misinformed; more probably the restriction in the size of the trees at the point mentioned has come from the effect of winds, since the forest there is much older than the 40 years indicated. The stunting of trees is a usual circumstance at the summits of many such mountains.

It is remarkable that peculiar species could survive such volcanic catastrophes on this mountain. Part of the endemic forms that once inhabited the region no doubt have perished from repeated volcanic disturbances, but some have remained as indicated by the list given above. Of these species, the following, found and described during our work, so far as now known, are peculiar to this mountain range:

- Oreopeleia lawrencii carrikeri*
- Pampa pampa excellens*
- Empidonax flavescens imperturbatus*
- Myioborus miniatus molochinus*
- Atlapetes apertus*

There is not much question that other novelties remain in the great forests of this region and that there is much to be learned of the distribution of birds in this area. Carriker, for example, heard *Odon-*

³El Volcán de Tuxtla. Bol. Soc. Geogr. Estad. República Mexicana, vol. 2, 1870, pp. 500-503.

tophorus calling in the mountains on various occasions but did not succeed in locating them. The higher mountains beyond Catemaco that have not been explored may easily harbor forms whose presence now is not suspected, and the great lowland forests along the sea to the west and northwest of Puerto México offer many possibilities.

MIGRATION

Located near the Gulf of Mexico at the northern end of the Isthmus of Tehuantepec, the Tuxtla region is on the route traversed by hosts of avian migrants from the United States and Canada. Many remain through the period of northern winter, and others pass in flight to or from more southern localities. Of the 291 forms in the present list, 86 are certainly northern migrants, while some individuals of various other forms, as some of the herons and other water birds, undoubtedly come here as visitors from farther north, though part may be resident in the locality. The number of migrants among aquatic species will be increased considerably by more extended observations in the marshy lagoons and along the larger rivers. Our records do not cover the period of fall movement but begin in January and continue through the spring.

Among the attractive sights to the naturalist in the Tropics of the New World, the great flights of migrant hawks that pass through Mexico and Central America twice each year rank among the foremost. The majority of these fine birds that made the spring flight north at Tres Zapotes in 1939 were Sennett's white-tailed hawks, but occasionally other species traveled with them. Northward movement began at the end of March and flights passed almost daily, usually in the forenoon, with the birds soaring in circles and at the same time drifting steadily toward the north. At times 50 or more were visible at once crossing the sky to disappear over the northern horizon, followed steadily by more, until I sometimes wondered how many passed in the course of a day. The flights in 1939 continued until I left the region on April 16. One morning I shot an everglade kite from one of these bands, and on April 6 and 10 turkey buzzards passed in flight northward, evidently migrant individuals of one of the two northern subspecies.

The smaller migrants, familiar summer residents of eastern and central North America, often came in waves as they do farther north. On March 21, 1939, following a tremendous rain that flooded all the low-lying country and drenched the jungle, I found the bushes and weeds of old fields crowded with orchard orioles, yellow warblers, and parula warblers, with others in lesser numbers. These birds continued in abundance until March 25, when there was a noticeable decrease among them. March 30 I recorded that another wave of

migrants had come in during the night, and from then on the procession seemed constant. During the end of March and early April I saw more orchard orioles near Tres Zapotes than I had observed in all my previous years of observation of this species in its northern home. On some days they fairly swarmed, so that it was necessary to scrutinize carefully every bird collected to avoid shooting them. Lincoln's sparrows, common as winter residents, also increased decidedly at the end of March for a brief space. The period from March 25 to April 15 seemed to mark the height of the migratory movement as a whole, though some species were passing until early May.

Other interesting migrants were the Merrill's pauraque (*Nyctidromus albicollis merrillii*) and Couch's kingbird (*Tyrannus melancholicus couchii*), which in our northern summer come barely within the southern boundary of the United States. Some of their number come to live briefly, in winter, with the resident races of the same species in the Tuxtla region.

That there is definite migration among some species wholly tropical in distribution is a fact that is becoming constantly better known as our observations extend. In the Tres Zapotes area, the yellow-green vireo (*Vireo flavoviridis flavoviridis*) falls in this category. Seemingly this bird withdraws after its nesting season, so far as most of its individuals are concerned at least, into South America, to return the following season to its breeding grounds. In 1939 I noted none to the time that I left on April 16. The following year Carriker found the first one on April 6, followed by another April 8, after which they were common. Possibly the white-bellied emerald hummingbird (*Aggyrtia candida candida*) may be a migrant also, since, although it was common in March both years, in 1940 Carriker did not record it until February 28, after which it was widely distributed. The sulphur-bellied flycatcher (*Myiodynastes luteiventris luteiventris*) appeared on April 1.

The striped flycatcher (*Legatus leucophaius variegatus*) also seemed to be migrant here, as it suddenly became common in April, though not recorded earlier. The Mexican crested flycatcher (*Myiarchus tyrannulus nelsoni*) was common after the middle of March but was not seen in winter. The peppershrike (*Cyclarhis guianensis flaviventris*) was recorded only after the first of March. Since it is found usually by its song, it may have been present earlier, though silent. The beginning of March marked the opening of its breeding period.

Further study in the field is needed to verify some of the observations just listed, which are based on scanty data. It appears, however, that there is definite shifting among some truly Tropical species for purposes of breeding.

The Mexican pipromorphna (*Pipromorphna oleaginea assimilis*), common on the Sierra de Tuxtla above 1,000 feet elevation, was taken once at Tres Zapotes on January 18, during a storm. Lichtenstein's warbler (*Basileuterus culicivorus culicivorus*), another common mountain species, seemed also to be a straggler to the lowlands, where it was taken at Tres Zapotes on January 26 and at Tlacotalpam February 7. The Mexican shrike-tanager (*Zanio auratus*), common to 2,500 feet in the mountains, was found at Tres Zapotes on January 26 and February 28. The brown-headed chlorospingus (*Chlorospingus ophthalmicus ophthalmicus*), which ranged mainly in the higher mountain forests, was obtained at Tres Zapotes on January 17. Though it is possible that there were local groups of these species resident in the lowland forests, it appears that there is a certain amount of altitudinal shifting in their search for food and because of cold and storms during the winter period. Much more study of this subject is required.

ANNOTATED LIST

Family TINAMIDAE

TINAMUS MAJOR PERCAUTUS Van Tyne

Tinamus major percautus VAN TYNE. Univ. Michigan Mus. Zool. Misc. Publ. 27, Aug. 1, 1935, p. 8 (Uaxactun, Petén, Guatemala).

The two obtained were taken by Carriker. On March 23, 1940, at 2,000 feet elevation on the Cerro Tuxtla, he found two fighting furiously and shot one, which proved to be a male. Others were heard from time to time on this mountain, but no more were seen. On April 8, in fairly heavy woodland near Hueyapa, between Tres Zapotes and Boca San Miguel, attention was drawn by a rustling sound to one skulking off through the undergrowth. This proved to be a female. The bird appears to be the rarest of the tinamous of the region and is a species known there to very few persons.

The decidedly gray coloration of the two specimens obtained is evident at a glance, the difference being a striking one when the skins are compared with specimens of *T. m. robustus* from the Caribbean region of central Guatemala. After examination of four specimens kindly lent me by Dr. J. Van Tyne from the original series from which he described the race *percautus*, it appears to me evident that the birds from the Tres Zapotes area are to be identified as that form. They agree in more grayish olive color above and in paler coloration below. The only difference that I can find is that the black crossbars on the wings and back in the Veracruz specimens are not quite so heavy, a difference that is very slight and one that I believe is due to individual variation. In his discussion of this new race, Van Tyne noted that

three skins in the Fish and Wildlife Service collection obtained by Nelson and Goldman at Teapa in south-central Tabasco, near the Chiapas boundary, showed an approach to *percautus* in the paleness of the underparts. On examination of these specimens again with the new material from the present collection, I consider that they should be called *percautus*, as should two other specimens in the National Museum that come from Buena Vista and Potrero, Veracruz, the first locality being to the west of Tres Zapotes and the second near Córdoba. This gives a logical distribution, since it makes *percautus* the most northern race of its species, extending from southern Veracruz to northern Petén, while *robustus* ranges on the Caribbean slope from Choctum and Nebaj, in east central Guatemala, south to Nicaragua.

CRYPTURELLUS SOUI MESERYTHRUS (Sclater)

Tinamus meserythrus P. L. SCLATER, Proc. Zool. Soc. London, 1859 (Feb. 1860), p. 392 (Playa Vicente, Veracruz).

Carriker secured a female near camp at Tres Zapotes on February 26 and a pair at about 800 feet elevation on Cerro de Tuxtla on May 8, 1940. The species seemed to be fairly common in the wooded lowlands through this region but was so secretive that it was seldom seen. During my own stay I heard tinamous calling daily, often immediately adjacent to our houses at camp, and on two or three occasions had indistinct glimpses of the birds along the trails. Never, however, did I secure a shot. Carriker notes that they rarely flush, usually hiding when approached. He reports that the two taken on May 8 were a breeding pair and that the female apparently had just completed laying.

CRYPTURELLUS CINNAMOMEUS SALLAEI (Bonaparte)

Nothocernus (sic) *sallaei* BONAPARTE, Compt. Rend. Acad. Sci. Paris, vol. 42, 1856, p. 954 (Córdoba, Veracruz).

Carriker secured a male in forest near Hueyapa on March 27, 1940.

This bird agrees with a small series taken by Nelson and Goldman on May 3 and 4, 1894, and also with an old skin in the U. S. National Museum from Mirador near Veracruz. While Peters in his Check-list (vol. 1, p. 21) has included birds from this area under true *cinnamomeus*, it appears that Conover⁴ and Brodkorb⁵ are correct in calling *sallaei* a distinct race. The series before me stands out definitely from other tinamous of this group.

As for the type locality of this form, Bonaparte says of it "du Mexique," but continues in a footnote to explain that he has named it for Auguste Sallé from a fine collection obtained by that traveler,

⁴ Proc. Biol. Soc. Washington, vol. 46, June 30, 1933, p. 114.

⁵ Occ. Pap. Mus. Zool. Univ. Michigan, No. 401, Mar. 1, 1939, p. 3.

principally in the vicinity of Córdoba in Veracruz and around the volcano Orizaba in Puebla. When more material is available to outline the distribution of the race, the type locality should be definitely designated.

CRYPTURELLUS BOUCARDI BOUCARDI (Sclater)

Tinamus boucardi P. L. SCLATER, Proc. Zool. Soc. London, 1859 (Feb. 1860), p. 391 (Teotaleingo, Oaxaca).

On the Sierra de Tuxtla this tinamou is fairly abundant, being confined to the higher levels above 1,000 feet elevation. The five specimens, taken by Carriker, come from the Cerro de Tuxtla, March 28 and 29, April 9, and May 7. They were calling at this season and decoyed to an imitation of their notes, though it was necessary for the hunter to be well concealed. They were heard frequently on San Martín, but none were taken here.

Family COLYMBIDAE

COLYMBUS DOMINICUS BRACHYPTERUS Chapman: Mexican Grebe

Colymbus dominicus brachypterus CHAPMAN, Bull. Amer. Mus. Nat. Hist., vol. 12, Dec. 23, 1899, p. 256 (Lomita Ranch, Lower Rio Grande Valley, Tex.).

In the two or three feet of water of the Laguna del Tular, 25 or 30 of these small grebes lived, so that I saw them frequently between March 17 and April 11. On March 29 I found a few in Laguna Larga. The open water available was small in extent, and the grebes ranged back into the swamp under the arching branches of bushes. On March 17 I fired at two under such cover and was much surprised when my boy came wading back with four fine specimens. One of these was preserved as a skeleton. The three skins include an adult male and two females in immature plumage. The birds were known locally as *viuda* or *viudita*.

Carriker in 1940 secured a female on March 21 on a lagoon north of Hueyapa, and shot three more, two males and a female, on February 15 and 19 near Tlacotalpam, where these grebes were fairly common in the many ponds and sloughs of that region.

After examination of considerable material, I have characterized the various races of this grebe as follows:

Colymbus dominicus dominicus Linnaeus:

Colymbus dominicus LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 223 (Hispaniola).

Under surface with more mixture of fuscous; flanks, sides, and crissum darker; bill slightly larger.

Eight males, wing 88.5–96.3 (92.0), culmen from base 21.5–24.5 (23.4), tarsus 30.0–33.6 (31.8) mm.

Seven females, wing 87.5–94.0 (90.3),⁶ culmen from base 19.0–21.3 (20.3), tarsus 28.5–32.1 (30.5) mm.

Cuba, Jamaica, Isle of Pines, Hispaniola, Puerto Rico, and many of the Bahama Islands; Cozumel Island.

Eight skins in the British Museum from Cozumel Island on the eastern coast of Yucatán agree with the Greater Antillean birds in darker flanks and sides and in the greater amount of fuscous on the breast. It is well known that Cozumel has definite Greater Antillean affinities in many elements of its avifauna.

Colymbus dominicus brachypterus Chapman:

Colymbus dominicus brachypterus CHAPMAN, Bull. Amer. Mus. Nat. Hist., vol. 12, Dec. 23, 1899, p. 256 (Lomita Ranch, Lower Rio Grande Valley, Tex.).

Under surface whiter, with the sides and flanks lighter, less fuscous; wing and bill averaging slightly shorter.

Sixteen males, wing 82.0–93.7 (88.7), culmen from base 18.0–24.7 (21.5), tarsus 29.4–33.8 (32.4) mm.

Eighteen females, wing 83.8–91.5 (87.4), culmen from base 18.0–22.6 (19.8),⁷ tarsus 29.3–32.5 (30.9) mm.

Southeastern Texas through Mexico and Central America to Panamá.

Another form has been described from Baja California by van Rossem and Hachisuka as *Colymbus dominicus bangsi*⁸ and as differing from *C. d. brachypterus* in smaller bill, grayer and paler upper parts, with the breeding plumage darker below, and spotting prominent. The proposed form is said to range in the arid tropical zone of Baja California, southern Sonora, and "probably other portions of northwestern Mexico." I have seen only two specimens from Baja California, a male with the culmen from base 19.4 mm. and a female with the same measurement 17.6 mm. While small, this is not remarkably so. In color these two do not differ from specimens from elsewhere in Mexico. Skins from Rosario in the State of Sinaloa, Mazatlán, Nayarit, and Manzanillo in Colima do not differ at all from typical *brachypterus*. In view of the data given above, I wish to withhold decision as to the validity of *bangsi* for the present, though it would seem that it is doubtfully distinct.

Colymbus dominicus speciosus (Lynch Arribáizaga):

Podiceps speciosus FELIX LYNCH ARRIBÁIZAGA, La Ley, Buenos Aires, July 2, 1877, p. 1 (Baradero, Buenos Aires, Argentina).

⁶ Five specimens; other two molting.

⁷ Measurements of 16 specimens.

⁸ *Colymbus dominicus bangsi* van Rossem and Hachisuka, Trans. San Diego Soc. Nat. Hist., vol. 8, June 15, 1937, p. 323 (Santiago, Baja California).

Similar in color to *dominicus* but with smaller bill.

Seventeen males, wing 89.0–99.5 (93.5), culmen from base 18.0–22.0 (19.8), tarsus 31.2–36.2 (32.9) mm.

Seven females, wing 86.9–97.1 (90.3), culmen from base 17.7–21.5 (18.8), tarsus 30.0–33.0 (31.2) mm.

South America, from Venezuela south to central Argentina.

This form is very similar to the West Indian bird except for its smaller bill. The only specimen I have seen from Argentina is slightly paler than birds from farther north, but it is immature and I consider its colors uncertain. It is possible that there may be two forms in South America, but this can be determined only with more abundant material.

Family PELECANIDAE

PELECANUS ERYTHORHYNCHOS Gmelin: White Pelican

Pelecanus erythrorhynchos GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 571 (Hudson Bay).

On April 16 a flock of a dozen flew above the Río Papaloapan at Tlacotalpam.

PELECANUS OCCIDENTALIS CAROLINENSIS Gmelin: Brown Pelican

Pelecanus carolinensis GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 571 (Charleston Harbor, S. C.).

The alcatraz was seen at Veracruz City on March 4 and at Alvarado on March 5 and April 16. One was observed in the Río Papaloapan at Tlacotalpam on March 6.

Family PHALACROCORACIDAE

PHALACROCORAX OLIVACEUS MEXICANUS (Brandt): Mexican Cormorant

Carbo mexicanus BRANDT, Bull. Sci. Acad. Imp. St. Pétersbourg, vol. 3, 1837, col. 56 (Mexico).

Cormorants were recorded along the Río Papaloapan and the Río San Agustín between Tlacotalpam and Boca San Miguel on March 6 and April 15.

Family ANHINGIDAE

ANHINGA ANHINGA LEUCOGASTER (Vieillot): Water-turkey

Plotus leucogaster VIEILLLOT, Nouv. Dict. Hist. Nat., vol. 1, 1816, p. 545 (Florida).

On March 31, 1939, I saw a water-turkey at Laguna Larga, near Tres Zapotes. Carriker shot an immature male in a marsh north of Hueyapa on March 21, 1940, and recorded others along the river between Boca San Miguel and Tlacotalpam.

Separation of races in this species has been discussed by van Rossem⁹ and by Griscom and Greenway.¹⁰ After examination of

⁹ Ann. Mag. Nat. Hist., Oct. 1939, pp. 439–440.

¹⁰ Bull. Mus. Comp. Zool., vol. 88, June 1941, p. 103.

considerable material it appears to me that two races may be maintained. *Anhinga anhinga anhinga* (Linnaeus), marked by larger size and broader tail tip, ranges from Venezuela and Ecuador to Brazil, and presumably to Argentina. *Anhinga anhinga leucogaster* (Vieillot), found from Colombia northward through Central America and Mexico to the southeastern United States, is slightly smaller. The race *Anhinga anhinga minima* described by van Rossem from the Pacific coast of Central America, from Nayarit to El Salvador, I consider at present as of uncertain status. The type and some others that I have seen are immature birds, as is the individual from Langtry, Tex., called *minima* by van Rossem. Adults are appreciably larger than immatures in this species, so much so that I am doubtful whether this race can be recognized. This needs to be settled definitely with adult material. The skin from Langtry, Tex., I consider to be merely a young individual of *leucogaster*.

Family FREGATIDAE

FREGATA MAGNIFICENS ROTHSCILDI Mathews: Caribbean Man-o'-war-bird

Fregata minor rothschildi MATHEWS. The birds of Australia, vol. 4, 1915, p. 280 (Aruba Island, Netherlands West Indies).

The man-o'-war-bird was recorded at Alvarado on March 6, 1939.

Family ARDEIDAE

CASMERODIUS ALBUS EGRETTE (Gmelin): American Egret

Ardea Egretta GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 629 (Cayenne).

One was seen at Laguna del Tular April 11.

HYDRANASSA TRICOLOR RUFICOLLIS (Gosse): Louisiana Heron

Egretta ruficollis GOSSE, Birds of Jamaica, 1847, p. 338 (Jamaica).

Occasional birds were seen at Laguna Tular and near the Arroyo Tepanaguasapan in March and April.

FLORIDA CAERULEA CAERULEA (Linnaeus): Little Blue Heron

Ardea caerulea LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 143 (South Carolina).

This was the most abundant heron around Tres Zapotes, where it was found in number at the lagoons from March 17 to April 13. Many were recorded along the river route between Tlacotalpam and Boca San Miguel on March 6 and April 15.

BUTORIDES VIRESCENS VIRESCENS (Linnaeus): Eastern Green Heron

Ardea virescens LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 144 (South Carolina).

In 1939 I saw green herons near Tres Zapotes on four occasions, March 13, 29, and 31 (when a male was taken) and April 3. Carriker, in 1940, found them fairly abundant around the ponds and lagoons and in the small tracts of swampy woods adjacent to Tlacotalpam, where he took specimens on February 6, 9, and 19. He recorded them also near Tres Zapotes and on May 7 shot a female along the small arroyo above the village of Tapacoyan, on the lower slopes of the Cerro de Tuxtla. The latter had the ovaries slightly enlarged.

The five specimens taken belong to the widely distributed eastern race. Whether the bird from Tapacoyan was near its breeding grounds, as indicated by the date and its condition, or whether it was a belated northern migrant is uncertain.

NYCTICORAX NYCTICORAX HOACTLI (Gmelin): Black-crowned Night Heron

Ardea Hoactli GMELIN, *Systema naturae*, vol. 1, pt. 2, 1789, p. 630 (Lakes of Mexico).

This night heron, known as *tandíl*, was a common inhabitant of lagoons and wooded swamps and was hunted as game. In evening, when the wind was from the south, I heard their calls from the lagoons near the village, and often the birds passed at night over our camp. They were common along the river route between Tlacotalpam and Boca San Miguel.

NYCTANASSA VIOLACEA VIOLACEA (Linnaeus): Yellow-crowned Night Heron

Ardea violacea LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 143 (South Carolina).

In March and April these birds were fairly common with the other night heron at lagoons near the village.

Family COCHLEARIIDAE

COCHLEARIUS COCHLEARIUS ZELEDONI (Ridgway)

Cancroma zeledoni RIDGWAY, *Proc. U. S. Nat. Mus.*, vol. 8, 1885, p. 93 (Mazatlán, Sinaloa).

The only one obtained, an immature female, was shot by Carriker's helper, Modesto, along the arroyo near Hueyapa.

Family CICONIIDAE

MYCTERIA AMERICANA Linnaeus: Wood Ibis

Mycteria americana LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 140 (Brazil).

A flock was seen circling high in the air at Tlacotalpam on March 6.

Family THRESKIORNITHIDAE

AJAJA AJAJA (Linnaeus): Roseate Spoonbill

Platalea Ajaja LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 140 (Jamaica).

Carriker recorded one May 1, 1940, between Tlacotalpam and Boca San Miguel. Nelson and Goldman found this species near Tlacotalpam in 1894.

Family ANATIDAE

DENDROCYGNA AUTUMNALIS AUTUMNALIS (Linnaeus): Black-bellied Tree Duck

Anas autumnalis LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 127 (America).

Carriker was told that this tree duck comes to the cornfields around Tres Zapotes in large numbers late in May and early in June to feed at night after the crops have been cleared and the ground burned for the June planting. The natives trap many at these sites. Carriker purchased one bird on May 2 which had been kept in captivity. I saw two downy young in bad state of plumage in the hands of native boys here early in April 1939.

CAIRINA MOSCHATA (Linnaeus)

Anas moschata LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 124 (Brazil).

On April 3, 1939, three flushed from a low tree in the lagoon adjacent to the village. Carriker secured the female of a pair on the arroyo at Hueyapa April 2, 1940. The bird seems rare in this vicinity.

QUERQUEDULA DISCORS (Linnaeus): Blue-winged Teal

Anas discors LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 205 (South Carolina).

Five of these teals were seen at Laguna del Tular on March 17, 1939. On April 2, soon after sunrise, two men rode into camp asking if we cared to buy *canates* (the name applied here to wild ducks of all species). They carried about 25 blue-winged teals in a woven bag, the birds having been partly skinned and partly plucked, eviscerated but otherwise complete. They had been boiled, probably so that they would not spoil, and were offered at the rate of two for 25 centavos. I was told that these ducks had been killed in the extensive lagoons near Boca San Miguel.

On April 11 I saw a flock of 12 blue-winged teals and another of 25 in the lagoon near the village, and on April 13 recorded a male in a small lagoon near the Arroyo Tepanaguasapan. On April 16 a dozen rested on the shore of the Río Papaloapan near Alvarado. In 1940 Carriker examined two killed on March 21.

NYROCA COLLARIS (Donovan): Ring-necked Duck

Anas collaris DONOVAN, British Birds, vol. 6, 1809, pl. 147 (Lincolnshire, England, from specimen found in Leadenhall Market, London).

On March 5, 1939, about 300 were seen in the Río Papaloapan in crossing from Alvarado to Tlacotalpam. On April 15, as I came into the latter place, about 25 were swimming in the river, and the following day an equal number were observed in returning to Alvarado.

NYROCA AFFINIS (Eyton): Lesser Scaup Duck

Fuligula affinis EYTON, A monograph on the Anatidae, 1838, p. 157 (North America).

On March 5, 1939, half a dozen were recorded among the abundant ring-necked ducks where the Río Chiquito enters the Papaloapan between Alvarado and Tlacotalpam. On April 15 about 20 were seen near Tlacotalpam, and the following day nearly 200 were seen between that point and Alvarado. The change in abundance in March and April between this species and the ring-necked duck was interesting.

Family CATHARTIDAE**SARCORAMPHUS PAPA (Linnaeus)**

Vultur Papa LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 86 (Surinam).

At Tres Zapotes I heard frequently of *el rey zope* and April 2 was called to see this bird, a king vulture, resting in a small tree a hundred yards in front of our camp. While seeming unafraid, it appeared nervous and moved about until it was partly concealed by a thin screen of leaves. It rested much of the time with the head lowered and thrust a little forward. The colors of the head were brilliant, the red seeming especially intense. A short distance away a large group of black vultures rested about some carcass that apparently had attracted the king vulture. Near sundown the bird flew away rather heavily with a loud swishing of its wings, flapping them quickly for several beats and then spreading them to sail for a short distance, the motion being exactly that of a black vulture under similar circumstances. On April 7 I recorded one soaring over the clearings at the edge of the great forest at Arroyo Corredor.

CORAGYPS ATRATUS (Meyer): Black Vulture

Vultur atratus F. A. A. MEYER, Zool. Annalen, vol. 1, 1794, p. 290 (St. Johns River, Fla.).

This scavenger species, common through the country, was abundant about the village of Tres Zapotes. Although they came all around our camp, few alighted in the clearing, as we permitted no waste to be thrown out and there was nothing to attract them. They

were known regularly as *zopilote*, which the archeologists informed me was an Aztec word, and occasionally I heard them called *nopo*. Bands gathered about every carcass in the pastures, and after gorging rested in flocks in the trees, or congregated closely on the ground. Sometimes the natives, seeing the latter, remarked jokingly "hay musica," comparing them to the human groups that packed about the native orchestras. When the air was heavy, these vultures remained perched, or flapped heavily about for short distances. On days of sunshine, they were often seen soaring high overhead. On one occasion a flock circling 300 yards or more above the earth suddenly partly closed their wings and descended to the grass. Their speed in descent was extraordinary. They often fought viciously over food, rising several feet in the air as they struck at one another. But once in the village I saw a hen turkey drive one away from the vicinity of her young brood, and on another day two small dogs, growling and barking, drove a flock of *zopilotes* from a dead pig for no other reason than a very apparent dislike for the birds.

CATHARTES AURA AURA (Linnaeus)

Vultur Aura LINNAEUS. *Systema naturae*, ed. 10, vol. 1, 1758, p. 86 (Veracruz, Mexico).

The turkey vulture was seen daily in the region about Tres Zapotes, either soaring with its usual ease over the open fields or resting in trees. It never joined the abundant flocks of black vultures that congregated at the bodies of all dead animals of medium to large size, from dogs and pigs to cattle and horses, and it was my impression that the turkey vulture was content with the dead of the smaller creatures for which there was less competition or, at any rate, less fighting among the scavengers.

While these notes are listed under the typical form, other races were observed; on April 6, for instance, I noted a considerable migration during which birds passed during the entire forenoon in little groups, turning in spirals high in the air and traveling steadily northward. A migrant flock of 30 individuals was seen following a similar course on April 10. These undoubtedly included one or both of the two northern races.

Family ACCIPITRIDAE

ELANUS LEUCURUS MAJUSCULUS Bangs and Penard

Elanus leucurus majusculus BANGS and PENARD, *Proc. New England Zool. Club*, vol. 7, Feb. 19, 1920, p. 46 (San Rafael, Calif.)

Between Tlacotalpam and Boca San Miguel on March 6, 1939, I saw several white-tailed kites flying over marshy places. Later in the month a pair established themselves on the little savanna im-

mediately below our camp at Tres Zapotes. I shot the male on March 17, when the female was carrying sticks to build a nest in a tree standing in a line of brush bordering a fence. The structure was located at the top of a tall, strong branch about 50 feet from the ground. On March 27 I noted that the female had another mate and recorded the pair several times after that in passing near the nest. The male taken has a wing measurement of 322 mm.

ROSTRHAMUS SOCIABILIS MAJOR Nelson and Goldman

Rostrhamus sociabilis major NELSON and GOLDMAN, Proc. Biol. Soc. Washington, vol. 46, Oct. 26, 1933, p. 193 (Catemaco, Veracruz, Mexico.)

Near Tlacotalpam the everglade kite was recorded in marshy places, where it was rather shy. It was more common around Tres Zapotes and there was usually tame, so that it was easily approached. I secured two here on March 27 and April 1, 1939, and Carriker shot two at the lagoon north of Hueyapa on March 5 and 21, 1940.

On March 27 at Laguna del Tular, I saw one resting in a dead tree that stood in the water, holding a large water snail of the genus *Pomacea* in its foot. It deftly extracted the animal with its bill, let the shell fall, and then, holding the mollusk in its talons, pulled it into small bits that it swallowed. Later I shot this individual and found that it was very fat. On April 1, while watching a flight of migrant hawks, I saw one of these kites circling among them but did not recognize it until I killed it at very long range. It seemed probable that it was one of the resident birds of this area that had merely come up to soar for the pleasure of it, so that its accompanying its migrant companions was a casual encounter. The long, broad wings and rather long, narrow tail with notched end noted when this bird was high in the air gave a curious silhouette strongly suggestive of the Old World kites of the genus *Milvus*.

The four specimens in the present collection, which come from near the typical locality of the race, bear out the characters of large size on which *major* is based. All are fully grown, though still in streaked and mottled plumage. Measurements are as follows: 3 males, wing 375, 380, 381, tail 203, 203, 210, culmen from cere 30.5, 31.2, 32.7, and tarsus 54.4, 55.1, 57.3 mm.; 1 female, wing 376, tail 200, culmen from cere 29.3, tarsus 54.9 mm.

ACCIPITER STRIATUS VELOX (Wilson): Sharp-shinned Hawk

Falco velox WILSON, American ornithology, vol. 5, 1812, p. 116, pl. 45, fig. 1 (Philadelphia, Pa.)

On April 7 I killed an adult female as it crossed an old clearing traveling in swift flight with a strong wind. I had glimpses of several

other sharp-shinned hawks along the borders of forest, probably all of this same species, but did not see them clearly enough for certain identification.

BUTEO ALBICAUDATUS HYOSPODIUS Gurney: Sennett's White-tailed Hawk

Buteo hyospodius GURNEY, Ibis, 1876, p. 73, pl. 3 (Medellín, Colombia).

Migrant flights of these hawks were recorded near Tres Zapotes from March 30 to April 12, the number seen varying from a few to several hundred during one day. They appeared in bands of varying size that traveled to the north, occasionally turning in spirals but even then drifting steadily northward. They were seen usually early in the morning and at times were accompanied by a smaller species that was probably *B. p. platypterus*, though none of these passed sufficiently near for certain identification. The white-tailed hawks were always high in the air, so that it was necessary to use field glasses to name them. They appeared white below, occasionally with a rusty wash on the lower breast, and were marked by the single broad band of black across the end of the white tail.

BUTEO MAGNIROSTRIS GRISEOCAUDA Ridgway

Buteo (Rupornis) magnirostris var. *griscocauda* RIDGWAY, Proc. Boston Soc. Nat. Hist., vol. 16, Dec. 1873, p. 87 (in key), p. 88 (orig. descr.) (Mexico).

These were the commonest hawks of the region, being spread everywhere through the more open monte and through the trees bordering the milpas, but not penetrating into dense forests. They are tame and noisy, calling with complaining, petulant notes when their haunts are invaded and usually allowing close approach without need for stealth or cover on the part of the collector. They seem generally rather sluggish, watching from perches for prey or swinging down across swales and openings to see what game they can surprise. Once I saw one in rapid pursuit of a small bird, but ordinarily other birds seemed to pay little attention to them.

In 1939 they were especially noisy during March and were seen at times turning overhead in short circles. Actual nesting seemed to begin at the end of the month, and on March 29 I saw one carrying nesting material. On April 7 I recorded one resting in a rather slight nest of sticks placed 25 feet from the ground in a small tree at the edge of a field. The natives assured Carriker that these birds catch many young chickens, but we saw no indication of this. Adults were taken on March 15, 1939, and January 22, 1940, at Tres Zapotes. Carriker secured one in immature plumage at Tlacotalpam on February 6, 1940.

These birds agree with specimens of *griscocauda* from elsewhere in Mexico.

There are three specimens in the collections of the U. S. National Museum taken by Nelson and Goldman at Frontera, in eastern Tabasco, March 5 and April 26, and Monte Cristo, May 5, that belong to the race *conspicetus*,¹¹ which differs from *griseocauda* in paler gray coloration.

BUTEO NITIDA PLAGIATA (Schlegel)

Asturina plagiata SCHLEGEL, Mus. Pays-Bas, vol. 2, Asturinae, 1862, p. 1 (Veracruz, Mexico).

One was seen April 12 at the border of an old field near Arroyo Corredor. As Veracruz is the type locality of *plagiata*, it is assumed that this is the race found at Tres Zapotes. In placing this bird in the genus *Buteo*, I agree with van Rossem¹² that *Asturina* has no characters to separate it.

PARABUTEO UNICINCTUS HARRISI (Audubon): Harris's Hawk

Buteo Harrisii AUDUBON, Birds of America (folio), vol. 4, 1837, pl. 392 (Bayou Sara and Natchez, Miss.).

On March 6, 1939, I observed a pair in a low tree standing in an open savanna near Tlacotalpam.

LEUCOPTERNIS ALBICOLLIS GHIESBREGHTI (Du Bus)

Buteo ghiesbreghtii DU BUS, Esquisses ornithologiques . . . , livr. 1, 1845, pl. 1 (Mirador, near Veracruz, Veracruz, Mexico).

Carriker saw two of these beautiful hawks on the Cerro de Tuxtla, where he collected a female at about 1,000 feet elevation on March 19.

HYPOMORPHNUS URUBITINGA RIDGWAYI (Gurney)

Urubitinga ridgwayi GURNEY, A list of the diurnal birds of prey, 1884, p. 148 (Guatemala and Mexico).

In 1939 I saw this hawk on various occasions above Tlacotalpam but did not secure specimens. Carriker shot one at Tlacotalpam on February 19 and two on the Cerro de Tuxtla on March 13 and 19, 1940.

The more extensive white banding on the tibia in the adult is an excellent character that distinguishes most individuals easily from the South American races.

BUTEOGALLUS ANTHRACINUS ANTHRACINUS (Lichtenstein): Mexican Black Hawk

Falco anthracinus LICHTENSTEIN, Preis-Verzeichniss mexicanischer Vögel . . . , 1830, p. 3 (Mexico).

Near Tres Zapotes I noted these birds regularly in the woodlands bordering milpas, where they often greeted me with high-pitched

¹¹ *Rupornis magnirostris conspicua* Peters, Auk, 1913, p. 370 (San Ignacio, Yucatán).

¹² Bull. Mus. Comp. Zool., vol. 77, 1934, p. 429.

eaglelike screams. The especially thick, heavy feathering made them hard to kill, especially since it was difficult to approach them within easy range. I secured an adult female that was laying at the Arroyo Corredor, April 12, 1939. Carriker shot an adult female near Hueyapa on March 7 and an immature of the same sex on the Cerro de Tuxtla at about 1,000 feet elevation near Tapacoyan on March 28, 1940.

BUSARELLUS NIGRICOLLIS NIGRICOLLIS (Latham)

Falco nigricollis LATHAM, Index ornithologicus, vol. 1, 1790, p. 35 (Cayenne).

On March 6, 1939, I saw a pair along the river below Boca San Miguel and later recorded one over a lagoon near Tres Zapotes. Carriker found a pair north of Hueyapa and shot the female on March 5, 1940. These hawks locally are called *cabeza vieja* because of their white heads.

In the small series at hand I can see no differences between birds from various localities in Mexico, Central America, and South America north of the lower Amazon.

CIRCUS CYANEUS HUDSONIUS (Linnaeus): Marsh Hawk

Falco hudsonius LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 129 (Hudson Bay).

On March 30, I recorded an adult female coursing over open milpas. Another female was seen near Tlacotalpam April 16.

GERANOSPIZA NIGRA NIGRA (Du Bus)

Ischnococcyz niger DU BUS, Bull. Acad. Roy. Belgique, vol. 14, pt. 2, 1847, p. 102 (Mexico).

On April 4, 1939, I shot a male at the Arroyo Corredor. As I moved quietly among the trees I suddenly saw its dark form clearly through the branches as it perched 15 feet from the ground in heavy, open forest. It was eating a large orthopteran. The feathers are dense, fluffy, and abundant, like those of some bird from a colder region.

I agree with Kirke Swann¹³ that *nigra* is a species distinct from *caerulescens*. While the darker color of *nigra* might be considered merely a melanism, the immature plumage is decidedly different in the white throat and in the style of markings on the lower surface. In the juvenile stage *caerulescens* is distinctly barred with white while in *nigra* the white appears more as irregular blotching.

¹³ Monograph of the birds of prey, vol. 1, pt. 3, May 30, 1925, p. 156.

Family FALCONIDAE

POLYBORUS CHERIWAY AUDUBONII Cassin

Polyborus Audubonii CASSIN, Proc. Acad. Nat. Sci. Philadelphia, vol. 17, 1865, p. 2 (Florida).

The caracara was seen regularly around Tres Zapotes during March and April, but it was not abundant.

HERPETOTHERES CACHINNANS CHAPMANI Bangs and Penard

Herpetotheres cachinnans chapmani BANGS and PENARD, Bull. Mus. Comp. Zool., vol. 62, Apr. 1918, p. 37 (Santa Lucia, Río Hondo, Quintana Roo, Mexico).

This interesting hawk was not rare around Tres Zapotes, the combination there of clearings and low forest being favorable to it, as it seems always to seek open tree growth, as at the borders of fields and savannas, but does not enter extensive areas of heavy forests. Usually its presence is revealed by its loud calls, which are heard mainly in morning and evening and carry for long distances. The notes seemed a little higher in tone than those of *H. c. queribundus* that I heard years ago in Paraguay and northern Argentina. The natives know it as the *vaquero* and say that when it perches among leaves it will rain, and that when it rests in the open on a dead tree the weather will be fair, a belief with a certain amount of truth in a country where rain is frequent and where the birds come out to sun themselves on clear days. Occasionally I saw these falcons turning in small circles 200 yards in the air with the short, round wings fully extended so that the tips of the primaries were widely separated. Under such circumstances the long tail gives an outline quite different from that of species of *Buteo* and allied hawks.

I secured a male at the edge of the forest at Arroyo Corredor on April 7, 1939. Carriker took another on January 20, 1940. The wing measurements are 261 and 273 mm. The smaller of the two has the wing somewhat worn.

One taken by Carriker on January 25, 1940, at Tres Zapotes has the wing 292 mm. In the National Museum there is a second specimen with the wing 289 mm. from Paso Nuevo, Veracruz, to the southeast of Tres Zapotes collected by A. E. Colburn between March 27 and April 22, 1901, and another (wing 283 mm.) obtained in March 1883 at "Santa Ana, Est. Veracruz" apparently Barra de Santa Ana, on the coast of eastern Tabasco.

FALCO FUSCO-COERULESCENS SEPTENTRIONALIS Todd: Aplomado Falcon

Falco fusco-coerulescens septentrionalis TODD, Proc. Biol. Soc. Washington, vol. 29, June 6, 1916, p. 98 (Fort Huachuca, Ariz.).

On April 6, 1939, I saw one near Cerro Chico Zapote, to the south of Tres Zapotes.

FALCO SPARVERIUS SPARVERIUS Linnaeus: Eastern Sparrow Hawk

Falco sparverius LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 90 (South Carolina).

The sparrow hawk was common on March 6, 1939, when I began observations at Tlacotalpam, and a male shot the following day was one of the first specimens that I secured at Tres Zapotes. The birds were seen on commanding perches on palms and other trees through the cornfields and were constantly observed about our camp. On March 17 I noted a sudden decrease in their number, due apparently to migration to the north. On April 2 two passed camp traveling due north. Scattered individuals were seen daily until my departure, and it appeared to me that some might be breeding birds, but of this I was not certain. Two taken on March 30 and April 3 appear identical with the bird of the eastern United States. Whether the sparrow hawk actually breeds in this area remains to be ascertained, though Ramón, my native assistant, said that they nested in holes in the palms.

Carriker secured specimens at Tres Zapotes on January 19 and April 5, 1940.

FALCO ALBIGULARIS ALBIGULARIS Daudin

Falco albigularis DAUDIN, *Traité d'ornithologie*, vol. 2, 1800, p. 131 (Cayenne).

This falcon is rare in the region under discussion, as we recorded it only twice. On March 22, 1938, I shot one from a tall, dead tree at the border of a grove, above an old milpa. Carriker secured another on May 5, 1940, from a dead limb of a very tall tree standing high up on the slopes of Cerro de Tuxtla. Both are males.

Family CRACIDAE

CRAX RUBRA RUBRA Linnaeus

Crax rubra LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 157 (western Ecuador).¹⁴

Carriker secured a pair on Cerro de Tuxtla on May 4 and 8. The bird was well known to inhabit the Tuxtla Mountains, but accounts of it were confused and conflicting. His first view of it was of a captive bird near Tuxtla, which had been reared from an egg. Near Tapacoyan this species was called *cholín*, while on the eastern side of the same mountain the natives knew it as the *faisán*, a name usually applied to *Penelope p. purpurascens*. On Volcán San Martín it was called *faisán real*.

¹⁴ See Hellmayr and Conover, *Publ. Field Mus. Nat. Hist., Zool. ser.*, vol. 13, pt. 1, No. 1, Apr. 30, 1942, p. 130.

Linnaeus gives the type locality in the original reference as "America," while in his twelfth edition in 1766, p. 270, he lists it as from "Peru."

PENELOPE PURPURASCENS PURPURASCENS Wagler

Penelope purpurascens WAGLER, Isis von Oken, vol. 23, 1830, col. 1110 (Mexico).

Two females were secured by Carriker on Volcán San Martín on April 16 between 2,500 and 3,500 feet and on April 17 between 3,000 and 4,000 feet. His notes on this species are as follows: "My first encounter with this magnificent bird was on Cerro de Tuxtla, on my second trip up there. I surprised a pair on top of a ridge at about 2,000 feet, and they burst into a fearful racket. One was clearly visible, so far as its head and tail, but a large limb concealed the body. I waited quietly for it to emerge, but it suddenly launched into a power dive down into the deep valley of the Río Lirios, followed by the concealed mate.

"On San Martín they were more abundant. On the second day of my stay there, while I was skinning birds in the afternoon, a man came along with a fine specimen he had shot and after considerable persuasion sold it to me for 3 pesos. The next day I shot another, and afterward several were seen high up on the volcano near 4,500 feet." He heard it called *faisán* and *faisán roncador* on San Martín and *cholin* on the east side of Cerro de Tuxtla, the latter name being applied to the curassow at Tapacoyan.

ORTALIS VETULA VETULA (Wagler)

Penelope vetula WAGLER, Isis von Oken, vol. 23, 1830, col. 1112 (near the city of Veracruz, Veracruz, Mexico).

The 10 specimens that we secured near Tres Zapotes were collected on March 28 and 31, 1939, and March 3 and 16, 1940.

The chachalaca, a name varied by some of the natives to chichalaca, is one of the most common of the larger birds of the region, hundreds of them being present. They are found regularly in tracts of heavy woodland, and they come out also from such cover into low thickets and thin lines of trees bordering milpas.

Early in the season, in January and February, it was difficult to see them, but with the opening of the breeding season in March and April, when they began to call, their true abundance became apparent. At alarms they flew heavily, or ran off along the larger limbs through the tree tops, usually so far ahead that they were safely hidden from our guns. Sometimes I found them dusting in loose soil between rows of corn in the milpas where these adjoined thickets. This must be a regular habit as I observed these dust baths on many occasions. When flushed they went immediately into the trees.

The calls are harsh and raucous and are sometimes mingled with a variety of chattering, clucking sounds. On some days the woods resounded with these notes, and when they were especially noisy our men often remarked on the fact, saying that there would be a change in the weather.

The names that have been employed for the more northern races of this species are in considerable confusion, due to different interpretations as to the identity of Wagler's *Penelope vetula*. The type of *vetula*, examined by van Rossem in the Munich Museum,¹⁵ is described by him as being in molt. The newly grown third rectrices have the tips pure white like those of birds from the lower Rio Grande area, while in the outer pairs this color is somewhat dirty and grayish owing to wear. Van Rossem remarks that the body color is very dark like that of birds from farther south (*jalapensis* of Miller and Griscom). He concludes that this specimen cannot be placed with the form that ranges north into Texas, and that it is unlike any other chachalaca that he has seen, being perhaps of an unknown race, though possibly an aberrant bird of the group currently known as *jalapensis*. This last suggestion is the one that it seems to me we must accept, a conclusion reached after careful examination of a long series of specimens.

According to Miller and Griscom,¹⁶ from information furnished by Dr. C. E. Hellmayr, Wagler's type was secured by a collector named Keerl, who worked near the city of Veracruz and then went up to Mexico City. The type locality for *vetula* was, therefore, designated by Miller and Griscom as "neighborhood of the City of Veracruz, Mexico," correcting their earlier designation¹⁷ of Tampico, Tamaulipas. The latter could not be correct, as Keerl did not enter that state. With the type of Wagler considered as coming from near Veracruz, then *vetula* must be applied to birds from that area.

Miller and Griscom¹⁷ have named *Ortalis vetula jalapensis*, with the type from Jalapa at an elevation of 4,400 feet in the state of Veracruz. Currently, for a number of years, the name *vetula* has been applied to the race from the lower Rio Grande Valley from Texas to Nuevo León southward through Tamaulipas, while *jalapensis* has been accepted for the race of chachalaca of the lowland area from Veracruz city southward through the state of Veracruz and farther.

There are available in the National Museum two skins collected by Nelson and Goldman at Jico, which is just outside Jalapa proper,

¹⁵ Trans. San Diego Soc. Nat. Hist., vol. 7, May 31, 1934, p. 350.

¹⁶ Auk, 1921, p. 455.

¹⁷ Auk, 1921, p. 46.

so that these may be taken as topotypical of *jalapensis*. There is also an old skin from Mirador near Veracruz city that should be considered as from near the type locality of *vetula*; and, in addition, there is the excellent series of 10 skins from Tres Zapotes. Except for one specimen to be mentioned immediately, these all agree in general in the buffy color of the tail tip and in dark-colored underparts when compared with a good series from Tampico north to the Brownsville area in Texas. These latter have the tail tip definitely white and the breast appreciably paler. One of the skins from Jico has the tail tip quite white, there being only a slight buffy tinge, so that it shows approach to the more northern form.

From consideration of this material, it appears that the area around Veracruz city and around Jalapa represents a region of intergradation between the more northern, lighter-breasted form with white tail tips and the darker race with buffy extremities on the rectrices that ranges south through southern Veracruz state into Guatemala. We may expect in this intermediate area a mingling of characters, which is found in the specimen from Jico mentioned above with the tail tippings definitely white. It seems reasonable to consider the type of *vetula*, which is described as having the third pair of rectrices tipped with pure white and the others a little duller also as an intermediate bird. The situation is highly unsatisfactory, but it appears logical in view of what has been said to give the name *vetula* to birds from Veracruz city and Jalapa southward, with *jalapensis* as a synonym, and to retain *mecallii* for the northern race found from Tamaulipas to the lower Rio Grande area. (This is in accordance also with the opinion of Hellmayr and Conover.¹⁸)

The birds from Tres Zapotes, therefore, are identified as typical *vetula*.

Family ARAMIDAE

ARAMUS GUARAUNA DOLOSUS Peters

Aramus pictus dolosus PETERS, Occ. Pap. Boston Soc. Nat. Hist., vol. 5, Jan. 30, 1925, p. 144 (Bolsón, Costa Rica).

Near Tres Zapotes, I flushed one of these birds April 13, 1939, at the border of a small lagoon choked with grassy vegetation and watched it fly across into swampy woods. Carriker saw a pair at Tlacotalpam and secured a female at a lagoon north of Hueyapa on May 3, 1940. The species is not common in this region.

¹⁸ Publ. Field Mus. Nat. Hist., Zool. ser., vol. 13, pt. 1, No. 1, Apr. 30, 1942, pp. 169-171.

Family RALLIDAE

ARAMIDES CAJANEA MEXICANA Bangs

Aramides albiventris mexicanus BANGS, Amer. Nat., vol. 41, Mar. 1907, p. 185 (Buena Vista, Veracruz, Mexico).

At Tres Zapotes everyone knew the *Montezuma*, or *pollo de Montezuma*, sometimes varied to *Moctezuma*, which for weeks I supposed to be this rail, a matter difficult to prove, however, because the birds were very shy. One day Ramón led me to a nest that he had found at the Laguna del Tular, a platform of sticks and weed stems 15 inches across, placed 5 feet from the ground in a bush standing in heavy forest just above the flooded edge of the swamp at the border of the lagoon. We watched for the birds but did not see them. On March 29, 1939, at Laguna Larga, I worked slowly along the edge of a wooded swamp where trees 30 to 40 feet high stood on enormous, flaring, buttressed roots that radiated from the trunk in all directions and rose to a height of 6 to 8 feet. Dark water lay beneath the trees, leading to an open area grown thickly with plants. The light was subdued and the air quiet in spite of a wind blowing strongly overhead. Tracks of rails were impressed in the mud, and twice I had indistinct glimpses of birds slipping away without sound. Each time, by a quick shot, I secured a fine male of this species, and the mysterious *Montezuma* was identified. Afterward, on April 1, I saw one along the Arroyo Valdez, where there was little water, and occasionally heard one call, but I had no further opportunity to get specimens. This species is sometimes called *poposcala*, in imitation of its call.

PORZANA CAROLINA (Linnaeus)

Rallus carolinus LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 153 (Hudson Bay).

Carriker secured a male at the edge of a pond near Tlacotalpam February 29, 1940. He notes that he had shot several other birds nearby, and apparently the rail had come out through curiosity to learn the cause of the noise.

LATERALLUS RUBER TAMAULIPENSIS (Nelson)

Creceiscus ruber tamaulipensis NELSON, Proc. Biol. Soc. Washington, vol. 39, Aug. 25, 1926, p. 105 (near the Tamesí River, Alta Mira, Tamaulipas, Mexico).

On March 16, 1940, at Tres Zapotes, a native brought a ruddy rail alive to Carriker, stating that he had caught it in high grass on a dry, open ridge in a pasture, far from any water. The bird was unknown to all those who saw it.

The specimen, a female, is in a way intermediate between the two previously known specimens of *tamaulipensis* and true *ruber* of Guatemala. The dorsal surface of the head is dark as in *tamaulipensis*. The wings, including the scapulars, and the tail also are dark as in the northern race. On the other hand, the reddish brown color extends over the back, though it is a little darker than in *ruber*. The Tres Zapotes specimen while differing in the extent of the chestnut of the dorsal surface, seems decidedly nearer the northern form and is identified with it, thus marking out a considerable range for this bird, from near Tampico, Tamaulipas, to southeastern Veracruz.

It is the only female at present known of the race. Measurements are as follows: Wing 77.8, tail 29.9, culmen from base 19.3, tarsus 29.5, middle toe without claw 29.0 mm.

Family HELIORNITHIDAE

HELIORNIS FULICA (Boddaert)

Colymbus fulica BODDAERT, Table des planches enluminées, 1783, p. 54 (Cayenne).

Along the Río San Agustín below Boca San Miguel, and through the channels to the neighborhood of Tlacotalpam, the finfoot is fairly common. On March 6, 1939, on my journey up river, I observed several, and others were recorded on my return April 15. Carriker saw them in this same region the following year. As the launch in which I traveled approached, they came swimming out with nodding head from the cover of bushes along shore, often floating rather high on the water. They flew rather quickly, being able to rise after four or five strokes of the feet in the water. The flight was quite fast, just above the surface, and was continued until the birds reached the cover of aquatic growth, into which they disappeared instantly. As they usually flew ahead, the white lower surface was not visible, the birds appearing almost black, with an indication of the light line over the eye.

On March 7, 1940, Carriker secured a pair on the small stream at Hueyapa.

Family JACANIDAE

JACANA SPINOSA GYMNOTOMA (Wagler): Mexican Jacana

Parra gymnotoma WAGLER, Isis von Oken, 1831, col. 517 (Mexico).

Near Tlacotalpam, the jacana is common about lagoons and ponds, extending along the river and on small channels to Boca San Miguel wherever there are floating masses of water-hyacinth. They fly continually before the launches that furnish means of travel in the streams, a pleasing and interesting sight. Natives call them the *gallito*.

At Tres Zapotes I found a few about the grassy shores of Laguna del Tular, where I shot an adult female on March 23, 1939. Carriker secured specimens near Tlacotalpam on February 6 and 9 and near Hueyapa on March 21, 1940.

Family CHARADRIIDAE

OXYECHUS VOCIFERUS VOCIFERUS (Linnaeus): Killdeer

Charadrius vociferus LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 150 (South Carolina).

In 1940 Carriker recorded the killdeer as fairly common around Tres Zapotes in January (one taken January 26), and at Tlacotalpam in February.

Family SCOLOPACIDAE

CAPELLA DELICATA (Ord): Wilson's Snipe

Scolopax delicata ORD, in reprint of Wilson's American ornithology, vol. 9, 1825, p. 218 (Pennsylvania).

Carriker found this snipe rather common in boggy pastures near Tlacotalpam, collecting a male on February 16, 1940.

NUMENIUS AMERICANUS Bechstein: Long-billed Curlew

Numenius americanus BECHSTEIN, in Latham's Allgemeine Uebersicht der Vögel, vol. 4, pt. 2, 1812, p. 432 (New York).

On February 8, 1940, Carriker found six or eight long-billed curlews at a shallow lagoon surrounded by extensive wet meadows near Tlacotalpam. He shot two females. One of these skins has the wing 267 and the culmen 160 mm. It might be identified as the northern race *occidentalis* as the measurements come within the upper limits assigned to that form. The second bird has the wing 263 mm. and the culmen 173 mm. The tips of the longest primaries are abraded so that the wing measurement is 3 or 4 mm. too short. This specimen therefore comes within the lower limits assigned to the larger southern race. Thus, two forms may be identified but pending further studies it seems better to record these two migrant individuals under the specific name.

BARTRAMIA LONGICAUDA (Bechstein): Upland Plover

Tringa longicauda BECHSTEIN, in Latham's Allgemeine Uebersicht der Vögel, vol. 4, pt. 2, 1812, p. 453 (North America).

From April 8 to 11, 1939, I heard these birds calling occasionally in evening as they passed Tres Zapotes in northward migration. On the morning of April 9 I saw one flying to the northwest, traveling about 80 yards above the earth.

ACTITIS MACULARIA (Linnaeus): Spotted Sandpiper

Tringa macularia LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 249 (Pennsylvania).

In 1939 I recorded one on the beach at Veracruz city on March 4, and saw several along the Papaloapan and San Agustín Rivers between Tlacotalpan and Boca San Miguel, March 6 and April 16.

TRINGA SOLITARIA SOLITARIA Wilson: Eastern Solitary Sandpiper

Tringa solitaria WILSON, American ornithology, vol. 7, 1813, p. 53, pl. 58, fig. 3 (Pocono Mountain, Pa.).

Solitary sandpipers were found about small lagoons on March 23 and 29, and April 11 and 13. A female shot March 29, with the wing 130 mm., while identified as the typical form on the basis of size, may come from an intermediate area since the inner web of the outer primary is distinctly freckled with white.

TRINGA SOLITARIA CINNAMOMEA (Brewster): Western Solitary Sandpiper

Totanus solitarius cinnamomeus BREWSTER, Auk, 1890, p. 377 (San José del Cabo, Baja California).

A female shot on March 29 with the wing 135.6 mm., while slightly small, is identified as the western form. The grayish white spotting on the upper surface is reduced in amount, and there is some freckling of white on the inner web of the first primary. It is intermediate but seems nearer *cinnamomea*.

TOTANUS MELANOLEUCUS (Gmelin): Greater Yellowlegs

Scolopax melanoleuca GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 659 (Chateaux Bay, Labrador).

On April 11, 1939, I saw several at Laguna del Tular near Tres Zapotes.

TOTANUS FLAVIPES (Gmelin): Lesser Yellowlegs

Scolopax flavipes GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 659 (New York).

Near Tres Zapotes in 1939 I recorded this species about small lagoons and pools on March 23 and April 3, 8, 11, and 13. Carriker found them common near Tlacotalpan in February 1940.

PISOBIA MINUTILLA (Vieillot): Least Sandpiper

Tringa minutilla VIEILLOT, Nouv. Dict. Hist. Nat., vol. 34, 1819, p. 466 (Halifax, Nova Scotia).

Carriker shot one near Tlacotalpan on February 19, 1940, and records seeing others about ponds in that vicinity.

Family RECURVIROSTRIDAE

HIMANTOPUS MEXICANUS (Müller): Black-necked Stilt

Charadrius Mexicanus P. L. S. MÜLLER, *Natursystem*, Suppl., 1776, p. 117 (Mexico).

Carriker found a few around a large pond near Tlacotalpam, where he collected a female on February 6.

Family LARIDAE

LARUS ARGENTATUS SMITHSONIANUS Coues: American Herring Gull

Larus Smithsonianus COUES, *Proc. Acad. Nat. Sci. Philadelphia*, 1862, p. 296 (eastern and western coasts of North America).

In 1939 I saw several in first and second year plumage at Veracruz city, March 4. They were recorded at Alvarado, March 5 and April 16, and over the Río Papaloapan at Tlacotalpam on March 6.

LARUS ATRICILLA Linnaeus: Laughing Gull

Larus Atricilla LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 136 (Bahamas).

In 1939 I recorded this gull near Veracruz on March 4, at Tlacotalpam on March 5, and near Alvarado on April 16.

Carriker shot a female in winter dress at Tlacotalpam on May 17, 1940.

THALASSEUS MAXIMUS MAXIMUS (Boddaert): Royal Tern

Sterna maxima BODDAERT, *Table des planches enluminées*, 1783, p. 58 (Cayenne).

Seen at Veracruz, March 4, and at Alvarado, April 16, 1939.

Family COLUMBIDAE

COLUMBA FLAVIROSTRIS FLAVIROSTRIS Wagler

Columba flavirostris WAGLER, *Isis von Oken*, 1831, col. 519 (state of Veracruz, Mexico).

The *torcaza*, as this dove was called locally, was common in areas of woodland near Tres Zapotes and is represented by specimens taken on March 10 and April 1, 1939. In 1940 Carriker shot one on February 10 at El Conejo on the coast south of Alvarado, and another at Hueyapa on March 8. They were seen regularly flying across the sky, and called daily from the forest. Their call is a guttural *coo coo coo-oo coo*, followed by a growling sound. On April 1 I caught sight of two crowding each other on a branch and shot them, expecting to secure a pair. It turned out that the two were males and that they

had been fighting. As the dry season came on, these pigeons came to drink at the arroyo near the village. I found palm seeds and figs in the crops of those examined.

Van Rossem¹⁹ has restricted the type locality to the state of Veracruz.

COLUMBA NIGRIROSTRIS *Slater*

Columba nigrirostris P. L. SLATER, Proc. Zool. Soc. London, 1859 (Feb. 1860), p. 390 (Oaxaca, Mexico).

Carriker secured three of these pigeons on the Cerro de Tuxtla on March 19 and May 7, the birds being rare. They were found also on Volcán San Martín. They ranged in the tops of giant trees, so high that one bird was so broken on striking the ground, after the long fall from the perch on which it was killed, that it could not be skinned. Attention was usually drawn to them by their strongly accented calls.

ZENAIDURA MACROURA CAROLINENSIS (Linnaeus): Eastern Mourning Dove

Columba carolinensis LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 286 (South Carolina).

In 1940 Carriker did not record mourning doves until May 1, when he saw several in riding from Tlacotalpam to Tres Zapotes. The following day his native assistant shot three from a small flock near Hueyapa, but only one was preserved as the birds were excessively fat. It appeared that these birds were on their northward migration after having wintered in some other locality.

The male preserved is a typical specimen of the eastern form.

ZENAIDURA MACROURA MARGINELLA (Woodhouse): Western Mourning Dove

Ectopistes marginellus WOODHOUSE, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, 1852, p. 104 (Cross Timbers, north fork of the Canadian River, Okla.).

On March 11, 1939, I flushed two in a cornfield and killed an adult male. No others were seen in the Tres Zapotes area.

ZENAIDA ASIATICA ASIATICA (Linnaeus): Eastern White-winged Dove

Columba asiatica LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 163 (Jamaica).

In the region known as Para Madera near Tres Zapotes, I saw a flock of about 50 of these pigeons in flight on April 13. Carriker shot one on the lower slopes of the Cerro de Tuxtla on May 6, 1940.

¹⁹ Trans. San Diego Soc. Nat. Hist., vol. 6, Aug. 30, 1930, p. 198.

SCARDAFELLA INCA (Lesson): Inca Dove

Chamaepelia inca LESSON, Description de mammifères et d'oiseaux récemment découverts . . ., 1847, p. 211 (Mexico).

Carriker secured two in the coastal sand dunes at El Conejo on February 12 and May 15, stating that he found one small flock here. He reports another observed on the trail between San Andrés and Cerro de Tuxtla. Apparently the species is rare in this region. It seems desirable to me to consider this bird as specifically distinct from the more southern *Scardafella squammata*.

COLUMBIGALLINA PASSERINA PALLESCENS (Baird): Mexican Ground Dove

Chamaepelia passerina ? var. *pallescens* BAIRD, Proc. Acad. Nat. Sci. Philadelphia, 1859 (Jan. 12, 1860), p. 305 (Cape San Lucas, Baja California).

Carriker found this little dove not uncommon in the coastal sandhills near El Conejo below Tlacotalpam, where he collected three females on February 12 and May 15. We did not see it elsewhere in the area covered. The skins secured appear slightly darker than a series from Texas.

COLUMBIGALLINA TALPACOTI RUFIPENNIS (Bonaparte)

Chamaepelia rufipennis BONAPARTE, Compt. Rend. Acad. Sci. Paris, vol. 40, 1855, p. 22 (Cartagena, Colombia).

The six specimens obtained were secured near Tres Zapotes on March 13, 22, and 27, 1939, and March 3, 5, and 15, 1940. The species is fairly common in the vicinity but local in its distribution, being found in little groups of six or eight. In periods of rain these doves came out to feed at the borders of clearings, one group being found regularly about our camp, so that I saw them daily during the early part of my work. As the dry season came on they remained in the thickets and the second-growth monte, where they fed on the ground, flushing when startled with a flash of reddish brown from their wings. When rainy days returned briefly, they appeared again in our camp clearing.

There is no question that *rufipennis* is conspecific with *talpacoti*.

COLUMBIGALLINA MINUTA INTERRUPTA Griscom

Chamaepelia minuta interrupta GRISCOM, Amer. Mus. Nov., No. 379, Oct. 17, 1939, p. 4 (Secanquim, Guatemala).

The only one obtained was a female that I took on March 25, 1939, near the Arroyo del Sitio at Tres Zapotes. The bird was shot rather hastily without recognizing its true identity until it came to hand from a flock of half a dozen that flew up at the edge of a cornfield to alight in a thicket. I suppose that in life this bird is often confused with *C. t. rufipennis*.

Identification as *interrupta* is made after examination of only a few specimens. Races in this small dove are uncertain, as there is much individual variation.

LEPTOTILA VERREAUXI FULVIVENTRIS Lawrence

Leptotila fulviventris LAWRENCE, Ann. New York Acad. Sci., vol. 2, 1882, p. 287 (Yucatán).

The seven specimens secured were collected on March 22 and April 10 and 12, 1939, and January 25, March 3 and 7, and April 9, 1940. They were common all through the woodland areas about Tres Zapotes but were wild and difficult to secure. When the woods became dry as the rains slackened, I seldom saw them as they always heard me and retreated ahead of me. Males were calling constantly after the middle of March, a resonant *coo-oo* with the last, accented syllable long drawn out. Occasionally at camp one walked out into the open when all was quiet to feed. Unlike the ground doves, which kept the head moving steadily and rapidly as they picked up food from the ground, this bird pecked only at intervals at small objects that it immediately swallowed. When startled, it stood quickly erect, drew the head and neck back, and then bowed suddenly, at the same time spreading the tail slightly and raising it. Females taken on April 10 and 12 were laying. Natives call this pigeon the *limonera*.

LEPTOTILA PLUMBEICEPS PLUMBEICEPS Sclater and Salvin

Leptotila plumbeiceps SCLATER and SALVIN, Proc. Zool. Soc. London, 1868, p. 59 (Choctum, Vera Paz, Guatemala).

Carriker shot a male on April 7, 1940, at 2,000 feet elevation on the Cerro de Tuxtla where it was drinking water in a deep ravine. The species is one easily confused with the more abundant *L. v. fulviventris*.

OREOPELEIA LAWRENCII CARRIKERI Wetmore

Oreopeleia lawrencii carrikeri WETMORE, Proc. Biol. Soc. Washington, vol. 54, Dec. 8, 1941, p. 205 (Volcán San Martín, Sierra de Tuxtla, Veracruz, Mexico).

Two were taken by Carriker on the Cerro de Tuxtla on March 19 and 29, between 1,000 and 2,500 feet, and one on the Volcán San Martín, on April 17, 1940, between 3,000 and 4,000 feet. They were quite common in heavy forest where they walked on the darkly shaded ground. Though retiring, they were not particularly shy, and when flushed ordinarily alighted again on the ground, though sometimes they perched in trees.

This new race marks a great extension of range for the species, known previously only from two forms, typical *lawrencii* of Veraguas, Panamá, and eastern Costa Rica, and *lentipes* named by Peters from Te-

norio, northwestern Costa Rica. *O. l. carrikeri* differs from these in being definitely paler above, with the crown, hindneck, and upper back lighter, brighter green, the center of the back and the scapular area lighter, more purplish, the wing coverts, tail, lower back and rump lighter, the sides and flanks paler brown and the under tail coverts whiter. In addition, the black streak on the malar region is decidedly wider and heavier.

OREOPELEIA MONTANA (Linnaeus): Ruddy Quail-dove

Columba montana LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 163 (Jamaica).

Near Tres Zapotes we had occasional glimpses of pigeons in the woodlands that we thought were this species. Carriker finally secured a breeding male between 800 and 1,500 feet on Cerro de Tuxtla on May 9, 1940.

Family PSITTACIDAE

ARATINGA ASTEC ASTEC (Souancé)

Conurus astec SOUANCÉ, *Rev. Mag. Zool.*, vol. 9, 1857, p. 97 (Mexico).

These parakeets ranged in pairs and small bands of six to a dozen individuals through woodland and second growth from Tres Zapotes and Hueyapa across to Tapacoyan. Their high-pitched chattering calls were heard regularly, and the birds themselves were seen constantly, sometimes at rest and sometimes on the wing. Seven were taken on March 8 and 18 and April 10, 1939, and on February 23, and March 8 and 14, 1940.

AMAZONA ALBIFRONS NANA Miller

Amazona albifrons nana W. DEWITT MILLER, *Bull. Amer. Mus. Nat. Hist.*, vol. 21, 1905, p. 349 (Calotmul, Yucatán).

Carriker, who collected five specimens, found these parrots more common than the larger species in the region between Tres Zapotes and Boca San Miguel, though the previous year I saw few. The five taken, four males and one female, vary in wing length from 160 to 169 mm. and so fall with the small race described originally from Yucatán, marking an extension of range.

According to specimens that I have examined, in *Amazona albifrons albifrons* the wing varies from 172 to 189 mm., while in *A. a. nana* it ranges from 154 to 170 mm. The smaller race averages slightly paler, more yellowish green, though this distinction is indefinite. I have seen one specimen from Apazote, Campeche, with the wing 175 mm., but all others fall within the limits assigned above.

AMAZONA AUTUMNALIS AUTUMNALIS (Linnaeus)

Psittacus autumnalis LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 102 (southern Mexico²⁹).

This common parrot is represented by skins taken on March 8, 15, and 23, 1939, and March 5 and 25, 1940. They ranged in pairs in the forest and morning and evening traveled across the sky uttering harsh notes that to me often suggested loud, ribald speech. Like others of the family, they remain in pairs. There has been much speculation on the part of aviculturists on methods of determining sex in living birds, so that on March 23, when I killed a pair, I was interested to note that in the female the head was distinctly smaller, and the anal opening larger, though the birds were not in breeding condition. In skinning these two, the skin of the neck in the female passed easily over the head, while in the male it was forced over with difficulty after considerable manipulation.

Family CUCULIDAE

PIAYA CAYANA THERMOPHILA Sclater

Piaya thermophila P. L. SCLATER, *Proc. Zool. Soc. London*, 1859 (Feb. 1860), p. 368 (Jalapa, Veracruz, Mexico).

Fairly common near Tres Zapotes where specimens were taken on March 9, 15, and 16, and April 13, 1939, and on March 3, 1940. In addition, Carriker collected specimens on the Cerro de Tuxtla on May 6 and 9 and near Tlacotalpam on February 7, 1940. The taller second-growth of abandoned milpas, and the small tracts of thickets and low forest bordering the fields, were their principal haunts, though I saw them occasionally in heavier forest in the more open tree tops, as at Arroyo Corredor. Their colors and their long slender forms, with their manner of movement, are excellent reason for the name of squirrel cuckoo, as they often suggest these mammals. While quiet in general, at times they move rapidly through the branches.

CROTOPHAGA SULCIROSTRIS SULCIROSTRIS Swainson

Crotophaga sulcirostris SWAINSON, *Phil. Mag.*, new ser., vol. 1, 1827, p. 440 (Temascaltepec, Mexico).

Common through the fields and pastures near Tres Zapotes, where I shot one March 18, 1939. Carriker collected one in the sandhills near El Conejo, February 12. They were known as *tigué*.

Frequently in the evening a little flock came through the trees at the edge of camp on their way to a roost, traveling always in the same direction, and I gained the impression that the bands were rather sedentary in that each had a limited range. On the day that

²⁹ See Peters, *Check-list of birds of the world*, vol. 3, 1937, p. 219.

I shot the specimen listed above, early in the morning I found a flock resting in the tops of bushes in old milpa, waiting for the sun to pierce a fog so as to dry their wet and bedraggled plumage. After looking them over, they appeared in such poor shape that I decided not to take a specimen. When I returned at 11 a. m. they were within 50 yards of the same spot, and as they were then dry and in good condition I shot one. They often rest with wings distended and tail spread to catch the sun. The notes of this species are high pitched and in the main are quite different from the querulous calls of *Crotophaga ani*.

TAPERA NAEVIA EXCELLENS (Sclater)

Diplopterus excellens P. L. SCLATER, Proc. Zool. Soc. London, 1857 (Jan. 12, 1858), p. 229 (San Andrés Tuxtla, Veracruz, Mexico).

This interesting cuckoo may be more common than is supposed, as it is shy and is found mainly in the breeding season when its presence is indicated by its calls. In 1939 I heard the double-noted whistle at intervals in brushy localities in old fields, but did not succeed in seeing one for some time. On April 13, in the region known as Para Madera, as I came down toward the Arroyo Tepanaguasapan, I heard one and began to imitate it, meanwhile walking slowly along. The sound proved to be louder and to come from a greater distance than I had supposed. Finally I caught sight of a grayish, long-tailed, crested bird resting in the shadow of branches 10 feet from the ground, but it disappeared immediately. I continued to call and the bird to answer, until it showed again, when I shot it. The alula has large, broad feathers, dark in color, in contrast to the rest of the wing. The pollex is highly flexible, so that the feathers were extended as I extended the wing.

Carriker secured one on the trail to Tapacoyan, on the base of Cerro de Tuxtla, April 9, 1940, and heard one calling at Tlacotalpam on May 17.

Family STRIGIDAE

GLAUCIDIUM BRASILIANUM RIDGWAYI Sharpe

Glaucidium ridgwayi SHARPE, Ibis, 1875, p. 55 (Mexico).

The nine specimens obtained were collected in 1940 by Carriker among the coastal sandhills at El Conejo on February 6, at Tres Zapotes on March 4, 6, 12, and 20, and near Hueyapa on March 8, 15, and 25 and April 2. Although these differ somewhat in depth of color, all of them curiously enough are in rufescent phase.

SPEOTYTO CUNICULARIA HYPUGAEA (Bonaparte)

Strix hypugaca BONAPARTE, American ornithology, vol. 1, 1825, p. 72, pl. 7, fig. 2 (plains of the Platte River).

In March 1939 one came occasionally at dusk to perch on mounds of earth at the archeological excavations adjacent to our camp.

CICCABA VIRGATA CENTRALIS Griscom

Ciccaba virgata centralis GRISCOM, Bull. Mus. Comp. Zool., vol. 69, Apr. 1929, p. 159 (Chivela, Oaxaca, Mexico).

The *tricolote* apparently is fairly common around Tres Zapotes, though entirely nocturnal, so that it was seen only by chance. On April 7, 1939, as we entered the heavy woodland at Arroyo Corredor, Ramón's keen eye discovered one of these owls resting in the top of a palm 10 feet from the ground, under the projecting fronds of the head, where it was protected from the rain that had been falling. This was a female about to lay. The iris was deep yellow, bill olive-green, cere dull brownish orange, toes dull olive, and claws horn color tipped with dusky. The left ear opening was 15 mm. in length and the right one 22 mm. The right opening appeared to include approximately twice the area of the left one.

On another day I flushed one in second-growth forest from a perch under a heavy mat of creepers 10 feet from the ground. As it flew silently away the light tail bars were prominent.

Carriker in 1940 secured skins at Tres Zapotes on March 6 and April 5, one being shot at night near camp. Two others were obtained near Hueyapa on March 7 and April 8. He noted two notes from this owl, one a hooting call and the other, heard at camp, resembling the crying of a child. The source of the latter was uncertain until he shot the bird.

These specimens agree with the characters of *centralis* and include birds in both light and dark phases. While Peters²¹ has placed the race named *eatoni* by the Kelso²² in the synonymy of *centralis*, more material may prove this to be a valid form, with a range including the extreme eastern section of Tabasco, Campeche, British Honduras, and northern Petén. The few that I have seen from this area appear to be smaller and generally paler than *centralis*, seeming clearer white below in the light phase. Owing to the double color phase in these owls, and their blending colors and color patterns, large series are necessary to work out their geographic forms successfully.

Family NYCTIBIIDAE

NYCTIBIUS GRISEUS MEXICANUS Nelson

Nyctibius jamaicensis mexicanus NELSON, Auk, 1900, p. 260 (Metlatoyuca, Puebla, Mexico).

²¹ Check-list of birds of the world, vol. 4, 1940, p. 154.

²² *Ciccaba virgata eatoni* Leon Kelso and Estelle H. Kelso, Auk, 1936, p. 216 (Apazote, Campeche, Mexico).

On April 11, 1939, I shot a fine male of this strange bird. As we crossed the savanna toward the village on that morning, Ramón volunteered the information that the other evening he had seen a *lechusa* in a tree nearby, so we walked over to see if it might again be there. The tree was rather open-leaved, one of a group of three or four growing on open savanna, with grasslands and low, scattered thickets near, the nearest forest being a quarter of a mile distant. I expected to find an owl, so that my astonishment was great to see this strange bird perched on a knob projecting from the side of the tree trunk 15 feet from the ground. It rested with the bill pointed up and the tail hung down, so that the body throughout was perpendicular to the tree trunk. From its colors and position, it looked exactly like a dead branch. In the hand, it gave me the usual feeling of amazement at its great mouth and broad wings.

The pupil of the eye was perfectly round and the iris bright yellow. The brain was no larger than an ordinary marble. The natives who examined it remarked that it had bad meat, and in skinning it I noticed that the body gave, to a powerful degree, the rank odor found in anis and trogons. The natives all seemed well acquainted with the species, and all called it the *lechusa*.

Family CAPRIMULGIDAE

NYCTIDROMUS ALBICOLLIS YUCATANENSIS Nelson

Nyctidromus albicollis yucatanensis NELSON. Proc. Biol. Soc. Washington, vol. 14, Sept. 25, 1901, p. 171 (Tunkas, Yucatán).

The resident race of *tapa camino*, as these birds are known to the natives, is represented by skins taken near Tres Zapotes on March 8 and 22, 1939, and March 5 and 6 and April 5, 1940. Carriker secured two near Tlacotalpam on February 9 and 20.

At Tres Zapotes these birds were common and were seen on many occasions when they flushed near at hand in the monte. They were often in pairs in March and April and rested on the ground in places where small areas of a few square feet were relatively free of undergrowth. As they flew the light wing markings showed prominently, and at times it appeared that the wings were moved in such a way as to display these spots. A flight of a few feet usually carried them behind some cover when they dropped again to the ground, though occasionally they alighted on logs or low branches where they rested along the long axis of the perch in the manner common to members of their family. Sometimes I could see them with ease on their new resting places, and sometimes they circled around and were lost. On one dull, cloudy day, one rose in heavy woodland and flew high and swiftly away through the trees in contrast to the usual low, erratic flight.

At nightfall these birds came out of the dense forest by dozens into more open areas, many frequenting the savanna near camp. I saw them often at dusk, flying low along the ground, when the white wing markings were little visible, and the birds appeared like any other brownish goatsucker, being marked mainly by the long tail. They remained out until dawn came to illuminate the trails and then retreated again to cover.

By night they were active and moved frequently, especially when feeding, resting on the ground and seeming at times to walk about where the earth was bare. More often I saw them fly up a few feet to seize insects in the air. Occasionally I picked one up in the light of my flashlight, when the eye glowed with a beautiful light orange-red. They rested with the head drawn in, but in the light of the flashlight often extended the neck and then retracted it, or sometimes raised to the length of the long legs and then dropped back again. By moving slowly while I held the circle of bright light steadily on them sometimes I approached within 20 feet of them, but ordinarily they were more alert and flew while I was at a distance.

They called regularly in evening for an hour or more, and again before dawn, while on moonlit nights they were so vociferous and so many were about that sleep in camp sometimes was difficult. The notes were so different from the ordinary description of them that I can see no reason for the common name of pauraque if that is assumed to be onomatopoeic in origin. Instead, they seem to say with much emphasis *who are you*, occasionally varied to *who are you*. Another call given in a steady monotone was *bup bup bup*, repeated steadily in a low voice a number of times. Still another note at a short distance sounded like the cutting swish of a heavy whip. After the first week in April, the calling was reduced in amount. It was not unusual to hear eight or ten at once near camp.

In the series taken two are in rufescent and six in grayish phase.

NYCTIDROMUS ALBICOLLIS MERRILLI Sennett: Merrill's Pauraque

Nyctidromus albicollis merrilli SENNETT, Auk, 1888, p. 44 (Nueces River, Nueces County, Tex.).

Among the *Nyctidromus* that I collected near Tres Zapotes, there is one male, shot on March 10, that belongs to this race, present as a migrant from the north. It was found in a similar location as the others obtained and, in fact, was not distinguished from them until examined in the Museum. It is in the rufescent phase and is marked by larger size and paler color when compared with *yucatanensis*. The wing measures 172.5 mm. and the tail 165 mm.

CAPRIMULGUS CAROLINENSIS Gmelin: Chuck-will's-widow

Caprimulgus carolinensis GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 1028 (South Carolina).

Carriker secured two, both in heavy forest, the first one at about 1,200 feet elevation on Cerro de Tuxtla on April 9, 1940. His assistant, Modesto, shot another at about 3,000 feet on Volcán San Martín, April 21.

CAPRIMULGUS VOCIFERUS VOCIFERUS Wilson: Eastern Whip-poor-will

Caprimulgus vociferus WILSON, American ornithology, vol. 5, 1812, p. 71, pl. 41, figs. 1-3 (Philadelphia, Pa.).

Carriker shot a female of this migrant at 1,500 feet elevation on Cerro de Tuxtla on April 9, 1940.

Family MICROPODIDAE

STREPTOPROCNE ZONARIS MEXICANA Ridgway

Streptoprocne zonaris mexicana RIDGWAY, Proc. Biol. Soc. Washington, vol. 23, Apr. 19, 1910, p. 53 (Río Seco, near Córdoba, Veracruz, Mexico).

These interesting swifts were seen at intervals of a few days about Tres Zapotes during the period of my stay, the first being taken on March 11, 1939. I secured others on March 25 and April 10. From three or four to a dozen were observed, usually flying over the milpas, but on April 10 I recorded 30 or more in company. One taken on March 25 was molting. In the air they appear black, but as they turn in swift flight there is occasionally a glimpse of white on the breast. They are known as the *golondrina*.

Family TROCHILIDAE

ARCHILOCHUS COLUBRIS (Linnaeus): Ruby-throated Hummingbird

Trochilus Colubris LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 120 (South Carolina).

Two females of this migrant from the north were shot at Tres Zapotes, one on March 20, 1939, feeding through low trees near camp, and the other on March 24, working about flowers in the open.

CHLOROSTILBON CANIVETII CANIVETII (Lesson)

Ornismya canivettii LESSON, Histoire naturelle des colibris, Suppl., 1830-31, pp. 174, 177, pls. 37, 38 ("Bresil"=Jalapa, Veracruz, Mexico).

Four specimens were secured near camp at Tres Zapotes on March 8 and 31, 1939, and January 29 and March 4, 1940. This was among the less common of the hummers in this region, being found feeding low down at the borders of thickets or in low, open brush. They are quite shy.

In the original description the type locality is given as Brazil, which is obviously erroneous. In a later account, in the Revue Zoologique for January 1839, page 15, Lesson refers to the two plates Nos. 37 and

38 cited above, gives the description again, with something of the habits as observed by DeLattre, and says "Elle est rare aux alentours de Jalapa," which fixes the type locality as I have listed it. Lesson's further statement that "M. DeLattre a tué une femelle à Kakamoukho, au Mexique" probably refers to *Chlorostilbon auriceps*, which is the related species found near Mexico City.

ANTHRACOTHORAX PREVOSTII PREVOSTII (Lesson)

Trochilus prevostii LESSON, Histoire naturelle des colibris, Suppl., 1830-31, p. 86, pl. 24 (locality unknown²³).

The only specimen is a female that I shot on March 31, 1939, near Tres Zapotes after it had darted at a becard resting in an open tree top and then perched nearby. I had seen one in this same locality a few days earlier, and recorded another near Arroyo Corredor on April 12. They are robust, heavy-bodied birds of rapid flight.

AGYRTIA CANDIDA CANDIDA (Bourcier and Mulsant)

Trochilus candidus BOURCIER and MULSANT, Ann. Sci. Agric. Lyon, vol. 9, 1846, p. 326 (Cobán, Guatemala).

The white-bellied emerald was one of the more common hummers, though Carriker noted that it may not be resident here, since he did not record it until February 28, 1940, after which it was widely distributed. I found the birds in the open, or at the border of thickets. Specimens were taken at Tres Zapotes on March 7, 14, and 27, 1939, February 28, March 15 and 16, and April 5, 1940, at Hueyapa May 15, and on the Cerro de Tuxtla on March 13. Carriker noted them at El Conejo near the coast in May.

AMAZILIA TZACATL TZACATL (De la Llave)

Trochilus Tzacatl DE LA LLAVE, Registro Trimestre, vol. 2, no. 5, 1833, p. 48 (Mexico).

This is one of the most abundant hummers in the area covered, being represented by a good series taken as follows: Tres Zapotes, March 14 and April 4, 1939, January 25, March 3, 4, 7, and 16, and April 5 and May 3, 1940; Hueyapa, March 14 and 25, 1940; and 600 feet elevation on Cerro de Tuxtla, April 3, 1940. There are other specimens in the National Museum secured by Nelson and Goldman at Tlacotalpam on May 28 and 29, San Andrés Tuxtla on May 10, and Catemaco on May 4, 1894.

Rieffer's hummer is a bird of strong, robust form that, with loudly humming wings, feeds around flowers in open places bordering areas of second growth forest, or penetrates the monte itself to range from

²³ See Simon, Histoire naturelle des Trochilidae, 1921, p. 276, footnote 1.

ground level to the tops of the trees. Like many of its kind, it is highly pugnacious and is constantly driving at all others that come near. As it hovers in the air before one, a common habit, the brown tail and under tail coverts form a conspicuous mark. All hummers are known to the natives in this region as *chupa miel*.

On March 27, 1939, I saw one working at a nest on a horizontal limb 25 feet above an open trail in the monte. On April 2, at camp, one came to pick up tiny fluffs of cotton that had blown from my skinning table, and on April 10 in the heavy forest at Arroyo Corredor I saw one fly to its nest with a bit of plant down in its bill. The nest was placed in a little bend in a branch of a small shrub 3 feet from the ground, for support being built completely around the twig. The structure was made of soft, whitish plant downs, covered externally with green bits of hepatics stuck on with spider webs. It contained two fresh eggs, pure white in color, that measure as follows: 14.3 by 9.2 and 14.5 by 9.2 mm.

AMAZILIA YUCATANENSIS CERVINIVENTRIS Gould

Amazilius cerviniventris GOULD, Proc. Zool. Soc. London, Nov. 11, 1856, p. 150 (Córdoba, Veracruz).

Four specimens of this hummer were secured at Tres Zapotes on March 7, 1939, and January 18 and 25, and March 4, 1940. I observed them about flowers in bushy growth, the brown tail and abdomen being prominent. The abundance of this species in the region is uncertain from existing information, as it mingles with the omnipresent *A. t. tzacatl*.

CAMPYLOPTERUS HEMILEUCURUS (Lichtenstein)

Trochilus hemileucurus LICHTENSTEIN, Preis-Verzeichniss mexicanischer Vögel, 1830, p. 1 (Mexico).

A fine series of males of this beautiful sabre-wing was taken by Carriker on Cerro de Tuxtla on March 11, 13, 19, and 23 and April 1, 1940, at elevations of between 1,000 and 2,500 feet. The birds were found in the undergrowth in heavy forest, rarely being seen above 10 feet from the ground. They were not abundant and were very shy. The call is a loud chirp. A female was shot between 2,500 and 3,000 feet on Volcán San Martín on April 21.

PAMPA PAMPA EXCELLENS Wetmore

Pampa pampa excellens WETMORE, Proc. Biol. Soc. Washington, vol. 54, December 8, 1941, p. 207 (Volcán San Martín, Sierra de Tuxtla, Veracruz, Mexico).

This fine new subspecies is based on four males collected by Carriker, the first shot on March 13, 1940, at about 2,000 feet on Cerro

de Tuxtla. Attention was called to it by the loud whirring noise that it made as it dashed about in short flights, chirping loudly. On April 22 he saw a considerable number on Volcán San Martín, congregated in one spot at about 3,300 feet, acting like the one found on Tuxtla.

On casual examination these birds are so like the two previously known races of *Pampa pampa* that there seems nothing especially remarkable about them, until it is noted that the much larger size of the four specimens of *cacellens* is actual and not due to any difference in preparation of skins. In fact, by bulk, the new form appears nearly twice the size of its relatives. In actual measurements, the bill and wing length are closely similar, though the bill in *cacellens* is heavier. The tail in the new form is broader and longer, and the head is much larger. The clearer gray of the underparts in *cacellens* is the principal color difference. The race probably is confined to the isolated Tuxtla Mountains.

PHAETHORNIS LONGIROSTRIS VERAECRUCIS Ridgway

Phaethornis longirostris veracrucis RIDGWAY, Proc. Biol. Soc. Washington, vol. 23, Apr. 19, 1910, p. 54 (Buena Vista, Veracruz, Mexico.)

In March and April 1939 I had occasional glimpses of a large *Phaethornis* near camp but did not succeed in getting a shot at one. They are very shy and have the habit of flying up close to a person for a second or two, then darting away at high speed so that they are almost instantly out of sight. Carriker, the following year, was more fortunate as he secured two on Cerro de Tuxtla, on April 3 and May 9. He recorded the species as occurring up to 1,500 feet elevation on the mountain, and found a nest on May 9 fastened to the tip of a pendant leaf of a palm, so that it hung only 3 feet from the ground. The attachment was by means of spider webs, which held the structure to the under side of the leaf. The nest was of rather coarse material without a downy lining. The two eggs were broken.

PHAETHORNIS ADOLPHI ADOLPHI Gould

Phaethornis adolphi GOULD. A monograph of the Trochilidae, pt. 14, Sept. 1857 (vol. 1, 1861), pl. 35 and text, part (Córdoba, Veracruz, Mexico).

This small hermit was one of the two most common hummingbirds (the other being *Amazilia t. tzacatl*) in the region around Tres Zapotes and over the lower slopes of the Sierra de Tuxtla. Specimens were taken between March 9 and April 5, 1939, and from January 17 to April 12, 1940. The birds were found mainly in heavy forest, though early in the morning before the light became too intense I saw them occasionally in the open bordering the monte. They

ranged low down, ordinarily moving with a subdued humming of the wings that was the only sound that I heard from them. As the woodlands became drier with the cessation of rains, they sometimes fed at higher levels. They were rather quiet for hummingbirds, though I observed a certain amount of fighting among them. When disturbed by my presence, possibly because of the proximity of a nest, they perched near at hand with the tail vibrating in a vertical arc of at least 60°, so rapidly that in the subdued light of the forest, the whitish spot at the tip appeared as a white line while the bird itself was almost invisible in the obscurity. A young bird just from the nest that I caught by hand on March 21 moved the uropygium rapidly in this same fashion, though the tail was only about one-third grown. This juvenile specimen is like the adults, except that the colors are duller. The feet in this species are yellowish white, in contrast to the blackish claws.

Family TROGONIDAE

TROGON COLLARIS PUELLA Gould

Trogon puella GOULD, Proc. Zool. Soc. London, 1845, p. 18 (Escuintla, Guatemala).

Carriker found the Jalapa trogon in the Sierra de Tuxtla and collected three pairs on Cerro de Tuxtla on March 11 and 19 and April 1 and 9, 1940, between 1,000 and 2,500 feet elevation. He records that they were as common both on the peak mentioned and on Volcán San Martín as the black-headed trogon is through the lowlands. They ranged almost invariably high among the trees where it was difficult to find them unless they were calling or flying about.

TROGON VIOLACEUS SALLAEI Bonaparte

Trogon sallaei BONAPARTE, Compt. Rend. Acad. Sci. Paris, vol. 42, 1856, p. 955 (Orizaba, Veracruz, Mexico).

Apparently the gartered trogon was only fairly common. In 1939, on March 16, I shot a male from a shaded perch in open monte where it was calling steadily. April 10 I collected another male just inside the woods at Arroyo Corredor. In this bird the edge of the eyelid was thickened to form a distinct fleshy ring, light yellow in color, clear around the eye. Carriker in 1940 saw only two, a male taken on February 27 and a female on March 27. All were found near Tres Zapotes.

TROGON MELANOCEPHALUS MELANOCEPHALUS Gould

Trogon melanocephalus GOULD, A monograph of the Trogonidae, ed. 1, 1838, pl. 12 (Tamaulipas, Mexico).

The black-headed trogon was the most common species around Tres Zapotes, being found in second-growth forest as well as in the virgin timber. Carriker recorded one at 1,200 feet elevation on Cerro de Tuxtla, but he considered the species uncommon over the lower slopes of the mountains. Specimens were taken on March 9 and 17 and April 12, 1939, and January 18, 22, and 29, February 22, and March 8, 1940, all near camp. The thickened fleshy eyelid is bright light blue in life. In March these birds were calling, and after the middle of the month I heard their notes constantly all through the afternoon as I worked at camp, as well as during the forenoon when I was afield. At this time also they seemed more alert and active, and occasionally one came to shaded perches in small trees outside my door to rest quietly, jerking the tail as it uttered a low *cuck*. The song is a cooing call that becomes suddenly faster at the end until it resembles a rattle. The natives called trogons *mira el sol*.

TROGON MASSENA MASSENA Gould

Trogon massena GOULD, A monograph of the Trogonidae, ed. 1, 1838, pl. 16 and text (Guatemala).

The only specimen obtained is a male, shot by Modesto, Mr. Carriker's assistant, at about 1,500 feet elevation on Cerro de Tuxtla on March 19, 1940. The bird was resting rather high in a forest tree.

This individual apparently is immature, as the breast feathers are gray, barred with grayish black. The wing coverts and secondaries are darker, having less mixture of whitish than others that I have examined with the exception of one skin from Teapa, Tabasco.

Family ALCEDINIDAE

MEGACERYLE ALCYON (Linnaeus): Belted Kingfisher

Alcedo alcyon LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 115 (South Carolina).

Several were recorded along the river channels between Tlacotalpam and Boca San Miguel on March 6, and near Tres Zapotes single birds were observed at Laguna del Tular until March 29, 1939. No specimens were taken, but it is supposed that these were the eastern subspecies.

MEGACERYLE TORQUATA TORQUATA (Linnaeus): Ringed Kingfisher

Alcedo torquata LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 180 (Mexico).

In 1939 I saw these birds along the Río San Agustín near Boca San Miguel and observed them occasionally about the larger lagoons

near Tres Zapotes. On April 13 I shot a laying female from a pair on the Arroyo Tepanaguasapan in the region known as Para Madera. Carriker secured one on March 5, 1940, and recorded them on the Río Papaloapan below Tlacotalpam.

CHLOROCERYLE AMAZONA MEXICANA Brodkorb

Chloroceryle amazona mexicana BRODKORB, Auk, 1940, p. 543 (Barra de Cahua-cán, Chiapas).

These kingfishers were fairly common along the main channels of the San Agustín and Papaloapan, between Boca San Miguel and Tlacotalpam, and were found in smaller number along the arroyo at Tres Zapotes, as well as around the lagoons. From the latter they ranged out through the flooded lands in the swampy woods after rains. I secured one on March 27, 1939, and Carriker took another on March 7, 1940.

CHLOROCERYLE AMERICANA SEPTENTRIONALIS (Sharpe): Texas Kingfisher

Ceryle septentrionalis SHARPE, Catalogue of the birds in the British Museum, vol. 17, 1892, p. 134 (Teapa, Tabasco).

Carriker secured specimens near Tres Zapotes on March 26 and May 2 and 3, 1940, along the arroyo, and recorded it as the most common kingfisher of the region. In 1939 I noted it only along the Río San Agustín near Boca San Miguel.

CHLOROCERYLE AENEA STICTOPTERA (Ridgway)

Ceryle superciliosa stictoptera RIDGWAY, Proc. Biol. Soc. Washington, vol. 2, April 10, 1884, p. 95 (Sisal, Yucatán).

Carriker secured a male along a small stream east of Tres Zapotes in rather heavy woodland. The wing measures 56.4 mm.

Family MOMOTIDAE

MOMOTUS LESSONII LESSONII Lesson

Momotus Lessonii LESSON, Rev. Zool., vol. 5, June 1842, p. 174 (Realejo, Nicaragua).

Lesson's motmot, known as *pájaro coo* from its call, was fairly common near Tres Zapotes but was so unexpectedly shy that I did not see one often. Though I heard their curious call of *hoo hoot* occasionally in the forest near camp, they seemed most common near the Arroyo del Sitio, where I shot a male on March 24, 1939. They perched nearly always behind a screen of leaves and usually flew before I caught sight of them. Carriker obtained specimens at Tres Zapotes on February 27, near Hueyapa on March 7 and 27, and on Cerro de Tuxtla on March 11 and May 10, 1940. They ranged at least to 3,000 feet on Volcán San Martín.

After somewhat prolonged examination of a good series of specimens, I am not able to separate satisfactorily the Mexican race called *goldmani* by E. W. Nelson from the bird of Panamá, Costa Rica, and Nicaragua. There is evident no difference whatever in size, individual variation being considerable. Some of the northern birds are a little greener than the average, but there is no definite distinction here, particularly since many individuals are in rufescent phase, which varies greatly in depth of color from specimen to specimen regardless of locality. The other color character that has been used, i. e., the amount of violet in the posterior margin of the blue crown cap, is definitely variable. In the majority of specimens from southern Central America, this color is extensive and prominent. It tends to lessen in amount in Mexican and Guatemalan specimens, and in occasional birds may be absent. Usually, however, it is present, and some individuals show as much as the southern birds. Any separation on this character must be purely arbitrary, and I consider it merely a tendency that has not become definitely stabilized with geographic locality. I believe, therefore, that it is necessary to unite all these motmots from central Veracruz and Oaxaca to Panamá under the name *lessonii*. This is in agreement with the conclusions of Dr. van Tyne.²⁴

Momotus lessonii erignus Ridgway from Yucatán and Campeche is well marked by paler coloration above and below, particularly in the shades of green, and in smaller size, the wing ranging from 123.7 to 130.1 mm. in the birds that I have seen. The bill also appears more slender.

As for the rufescent phase in these birds, the juveniles I have seen are all of a rufescent-brown shade above and below, so that the phase mentioned may represent a partial stage of this early coloration.

Peters²⁵ has indicated his belief that all the blue-crowned motmots of the genus *Momotus* are conspecific and therefore to be included under the oldest specific name *momota*. This seems a reasonable conclusion, but until the question has been fully checked to determine it completely I have preferred to list this series from Veracruz as *M. lessonii lessonii*.

HYLOMANES MOMOTULA MOMOTULA Lichtenstein

Hylomanes Momotula LICHTENSTEIN, Abh. Akad. Wiss. Berlin, 1838 (1839), p. 449, pl. 4 (Valle Real, Mexico).

While found in the Sierra de Tuxtla, apparently these odd little motmots are not common. Carriker secured two females on Cerro de

²⁴ Univ. Michigan Mus. Zool., Misc. Publ. 27, Aug. 1, 1935, p. 19.

²⁵ Bull. Mus. Comp. Zool., vol. 69, 1929, p. 425.

Tuxtla on March 11, 1940, and two more of the same sex between 2,500 and 3,000 feet on Volcán San Martín on April 16 and 21. They were encountered low down in the undergrowth in heavy forest.

Brodkorb recently has described a new form ²⁶ from Chiapas, differentiating it on the basis of shorter bill, darker pileum, and less bluish wash on sides. His measurements of the culmen from base (without regard to sex) range from 25.5 to 27 mm. It may be noted that in eight available skins from Veracruz and Tabasco the same measurement runs 24.5, 26.7, 26.7, 26.9, 27.1, 27.3, 27.3, and 30.2 mm., thus including the dimensions of the proposed race. In view of the variation exhibited by the species, the color differences proposed should be carefully checked. The only distinction I can find that holds in our series to distinguish the southern form named *obscurus* by Nelson from Panamá, whose range extends into northwestern Costa Rica, is that it has the abdomen less definitely whitish.

Ridgway ²⁷ believed that Valle Real, the type locality of *momotula*, is in Veracruz.

Family RAMPHASTIDAE

AULACORHYNCHUS PRASINUS PRASINUS (Gould)

Pteroglossus prasinus GOULD, A monograph of the Ramphastidae, 1834 (1833), pl. 29 and text (Valle Real, Mexico).

Carriker found this species common through the forests across the summit of Volcán San Martín, securing five specimens on April 17 and 20, 1940. As usual, the birds were hard to see among the green leaves, though it was not difficult to approach them. He did not find them on Cerro de Tuxtla.

These five specimens all agree in having the white of the throat definitely yellowish, especially on the lower portion, and a distinct yellow area on the side of the head below the eye, bordering the posterior margin of the white of this region, and so forming the border between the white and the green of the posterior area of the side of the head. Six specimens of *prasinus* from Mirador, and Jalapa, Veracruz, all lack this yellow, so that at first glance the San Martín birds appear distinct. However, since I find these same two styles of coloration in series of the races *stenorhabdus* and *virescens*, I assume that it is individual variation, due possibly to age.

²⁶ *Hylomanes momotula chiapensis* Brodkorb, Occ. Papers Mus. Zool. Univ. Michigan, No. 369, Apr. 11, 1938, p. 2 (1,900 meters on Mount Ovando, Chiapas).

²⁷ U. S. Nat. Mus. Bull. 50, pt. 6, 1914, p. 486.

PTEROGLOSSUS TORQUATUS TORQUATUS (Gmelin)

Ramphastos torquatus Gmelin, Systema naturae, vol. 1, pt. 1, 1788, p. 354 (Central America²⁸).

Near Tres Zapotes, the Aracari toucan was uncommon, but on the lower slopes of the Tuxtla Mountains Carriker found it in greater abundance. Our specimens were taken on April 5, 1939, and February 22 and 24 and May 6, 1940, the last being the only one obtained on the mountain. On April 5 one flew past me into open woodland on the Cerro Nestepe, which is really in the foothills of the mountains. I followed and shot it and immediately thereafter secured a pair. These birds were at the opening of the breeding season. On April 8 I found others nearer Tres Zapotes, feeding on fruits in an open tree at the edge of monte. They were seen in small groups of four or five, flying and moving about with greater celerity and much less awkwardly than the larger toucans. They utter harsh, rattling calls that can be heard for some distance.

The iris is clear yellow, except that bordering the round pupil toward the inner and outer canthi of the eye there is a slight area of black that merges into the black of the pupil, so that it can be detected only on careful examination in good light. This gives the pupillar opening an oblong appearance, while in reality it is round.

RAMPHASTOS SULFURATUS SULFURATUS Lesson

Ramphastos sulfuratus Lesson, Traité d'ornithologie, pt. 3, July 1830, p. 173 (Mexico).

The large toucan was uncommon but not rare, being seen occasionally through the forested areas east of Tres Zapotes, near Hueyapa, and up to 2,000 feet elevation on the Sierra de Tuxtla. They were usually found resting in the very tops of the taller trees, where occasionally they called for long periods without moving, except to swing the huge bill about. They were known locally as the *pico canon*. Carriker secured five specimens near Tres Zapotes on March 4, 18, and 27, 1940.

Peters²⁹ has shown that *Ramphastos piscivorus* of Linnaeus, long current as the name for this bird, is a composite, hopeless to identify. The species therefore takes the next name available, *sulfuratus* of Lesson.

²⁸ Designated by Cory, Publ. Field Mus. Nat. Hist., zool. ser., vol. 13, pt. 2, No. 2, 1919, p. 368. Peters, Bull. Mus. Comp. Zool., vol. 69, 1929, p. 436, has listed the type locality as southeastern Mexico.

²⁹ Auk, 1930, pp. 406-407.

Family PICIDAE

DRYOBATES SCALARIS RIDGWAYI Oberholser

Dryobates scalaris ridgwayi OBERHOLSER, Proc. U. S. Nat. Mus., vol. 41, June 30, 1911, p. 143 (Jaltipan, Veracruz, Mexico).

The four specimens taken were found in the vicinity of camp at Tres Zapotes on April 10 and 12, 1939, and March 8, 1940. They ranged in the open pastures and old fields in which there were scattered tracts of brush. On April 10 I found a nest hole 9 feet from the ground in a dead tree standing just outside a thicket. A male taken here showed definite incubation patches, while in a female, shot at this same place two days later, they were absent.

Measurements are as follows: 2 males, wing 89.4, 90.5, tail 47.4, 49.8, culmen from base, 19.3, 20.2, tarsus 16.1, 16.5 mm.; 2 females, wing 84, 85.5, culmen from base 17.6, 17.9, tarsus 16.5, 17.1 mm.

VENILIORNIS FUMIGATUS SANGUINOLENTUS (Sclater)

Chloronerpes sanguinolentus P. L. SCLATER, Proc. Zool. Soc. London, May 1859, p. 60, pl. 151 (Omoa, Honduras).

This is the most common woodpecker of the region, ranging both in forest and in the lower second growths that come to cover the abandoned fields of the farmers. They often feed low down near the ground, sometimes under rather heavy cover. Carriker found them at 2,000 feet and higher in the Sierra de Tuxtla. They remind me of the downy woodpecker (*Dryobates pubescens*) of the North in their industrious habit of working with steady pecking at wood containing food. Sometimes I found them climbing over palm spathes. The call is a rattle somewhat suggestive of that of the downy woodpecker already mentioned.

Specimens were obtained near Tres Zapotes on March 13 and 21 and April 4, 1939, and February 24 and 28 and March 4, 1940, and on Cerro de Tuxtla on March 23, April 1 and 3, and May 4, 1940. The bills in this series average larger than in birds from Honduras so that the two groups probably are subspecifically distinct.

PHLOEOCEASTES GUATEMALENSIS REGIUS (Reichenbach)

Campcophilus regius REICHENBACH, Icones ad synopsis avium, No. 12, Scapsores, Picinae, 1854, p. 393, pl. 649, figs. 4331-4332 (Papantla, Veracruz).

These large, handsome woodpeckers, of robust form, were fairly common through areas of heavy forest, though somewhat less abundant than *Ceophloeus lineatus similis* found with them. On April 4, in the heavy woodland at Arroyo Corredor, I heard a clear, staccato

woodpecker drum of two notes only, delivered rapidly with force and emphasis, with a pause before repetition, that brought to mind immediately the similar performance of the related *Phlococeastes leucopogon* of northern Argentina. And following this sound and the loud hammering that accompanied it, I collected a fine pair of *P. g. regius*. Others were observed and heard regularly throughout my stay. Carriker secured three near Hueyapa on March 8 and 25, 1940, including two fully grown young birds in juvenal plumage. These are strong-muscled, robust birds with tough, thick skins, so that their preparation as specimens entails definite physical labor. A needle will scarcely penetrate the thickened skin of the back of the head.

Following are measurements of the adult specimens: 2 males, wing 190, 195.5, tail 103.3, 105.4, culmen from base 56.2, 51.0, tarsus 38.2, 38.2 mm.; 1 female, wing 185.5, tail 111.3, culmen from base 47.5, tarsus 33.7 mm.

The race *regius* is separated from typical *guatemalensis* solely by average larger size, there being definite overlap in dimension. The birds from the Tres Zapotes area come within the limits set for *regius* and are so identified, though it must be stated that the form is based on differences that are not at all sharp cut or trenchant.

CEOPHLOEUS LINEATUS SIMILIS (Lesson)

Picus similis LESSON. Oeuvres complètes de Buffon, vol. 20, Apr. 1847, p. 201 (San Carlos, El Salvador).

The five specimens secured were obtained near Tres Zapotes March 15 and 16, 1939, and January 26 and March 3, 1940, and Hueyapa, March 15, 1940.

The species was fairly common through wooded areas, coming into the more open second growth, and into dead trees in the fields where clearings bordered the forest. It was known locally only by the name *carpintero* applied to all woodpeckers. I heard them uttering a chattering call that was not unlike that of a *Centurus*, while the drum was a loudly resounding, rapid roll, slowing slightly toward the end. It resembled the sound made by *Ceophloeus pileatus* of the North but was slightly slower. The flight is bounding, and seemed somewhat heavier than that of the pileated woodpecker. On April 8 I found a pair working on a nest hole 50 feet from the ground in a dead tree at the border of a tract of forest. Two days later I noted one looking out from a nest hole cut 20 feet from the ground in a dead tree trunk standing in an old field.

CELEUS CASTANEUS (Wagler)

Picus castaneus WAGLER, Isis von Oken, 1829, p. 515 (Veracruz, Veracruz, Mexico³⁰).

Carriker secured a pair on March 19, 1940, at an elevation of about 1,000 feet on Cerro de Tuxtla. The birds were ranging low in an area where the forest was dense above and dark below.

PICULUS RUBIGINOSUS YUCATANENSIS (Cabot)

Picus yucatanensis CABOT, Proc. Boston Soc. Nat. Hist., vol. 1, May 1844, p. 164 (road from Chemax to Yalahao, Yucatan³¹).

Carriker found these birds fairly abundant in the forest over the higher elevations of the Sierra de Tuxtla, taking specimens on Cerro de Tuxtla on March 19 and April 1 and 9 and on Volcán San Martín on April 22 and 23, 1940. He saw them frequently low among the trees on the smaller trunks, even on the thorny palms.

These specimens range somewhat smaller than the dimensions usually given for this race, being as follows: 3 males, wing 114.5–116.2, tail 62.2–65.2, culmen from base 24.3–26.3, tarsus 20.8–22.0 mm.; 4 females, wing 111.4–115.4, tail 60.2–70.0, culmen from base 22.3–25.3, tarsus 20.2–21.7 mm.

CENTURUS AURIFRONS VERAECRUCIS (Nelson)

Melanerpes dubius veracrucis NELSON, Auk, 1900, p. 259 (Coatzacoaleos, Veracruz).

The 11 specimens come from near Tres Zapotes, March 8, 14, 23, and 31, 1939, January 20, February 26, and March 7, 1940, and from Tlacotalpam, February 6, 1940. The form is one that ranges throughout the area from the coastal sandhills to the lower slopes of the Sierra de Tuxtla, principally in open country with scattering trees, though found occasionally in the higher trees of the forests. The lanes bordering the milpas were especially favored by them. The natives recognize this form of *carpintero* as one that feeds on corn.

The general habits and appearance of this woodpecker are similar to others of its group. The flight is bounding, accompanied often by flashes of color from the white of the rump and the red of the head. The call notes are chattering, and the drum is rapid, though rather short. The nesting season came at the end of March, when the birds became especially noisy and vociferous. On March 23 I observed a pair working on a nest hole in a large dead tree standing in a weed-grown field. By the end of the month all were mating.

³⁰ Designated by Cory, Publ. Field Mus. Nat. Hist., zool. ser., vol. 13, pt. 2, No. 2, Dec. 31, 1919, p. 453.

³¹ Cabot, Boston Journ. Nat. Hist., vol. 5, 1845, p. 92, says: "I saw only two of these birds, and procured this one specimen in March, 1842, on the road from Chemax to Yalahao."

The relationships and name for the birds in this collection have been established only after a detailed study of all the woodpeckers of this type found from Texas to Costa Rica.

On first examination of this group of forms they appear a hopeless jumble, but with study an orderly arrangement becomes evident. The scheme here outlined in detail is that indicated by Griscom³² except that it appears that *veracruensis* is distinct rather than a synonym of *grateloupensis*.

After a somewhat prolonged study, it is evident that there are two principal types of these woodpeckers. The first comprises those with the dorsal surface boldly barred with black and white, and the abdomen yellow, including the three subspecies *aurifrons*, *polygrammus*, and *frontalis*. The second has the white barrings decidedly narrowed, so that with the black predominant the appearance is quite different, this group covering the subspecies *veracruensis*, *dubius*, *leei*, *santacruzii*, *pauper*, *canescens*, and *insulanus*. I am inclined to believe that the red abdomen found in typical *veracruensis*, *dubius*, and *leei* is the original condition, and that the yellow and orange-yellow of the abdomen in *santacruzii*, *pauper*, *canescens*, and *insulanus* represent a modification of this. I also think that the two general groups distinguished by difference in dorsal pattern have arisen independently and that they have joined subsequently by merging at their points of contact. The race *grateloupensis* is a present-day series of intermediates between the two. On this thesis, the heavily barred group may have had a more extensive former range from which it may have been crowded in part by invasion of the other. This would account for the present distribution, where there is apparently no actual contact between *aurifrons* and *polygrammus*, though the separation is for a small distance only, as well as for the far greater separation of *Centurus hoffmanni*, which now is so different as to rate treatment as a separate species.

Following is a synopsis of the races of *Centurus aurifrons* according to my present understanding of them:

Centurus aurifrons aurifrons (Wagler):

Picus Aurifrons WAGLER, Isis von Oken, vol. 22, pt. 5, May, 1829, col. 512 (Ismiquilpam, Hidalgo).

Abdomen yellow; bands of white and black on dorsal surface broad and heavy; middle rectrices entirely black; male, forehead yellow, crown patch red, nape orange; female, with crown gray.

Birds from San Luis Potosí to Jalisco, i. e., those in the southern part of the range, appear to have the black markings above somewhat heavier, but this is an indefinite tendency only.

³² Bull. Amer. Mus. Nat. Hist., vol. 64, 1932, pp. 226-230.

Texas (most of the State) south into Mexico, from Tamaulipas and eastern Chihuahua southward to Hidalgo, Jalisco, and Michoacán (west of Veracruz).

Centurus aurifrons polygrammus Cabanis:

Centurus polygrammus CABANIS, Journ. für Ornith., 1862, p. 362 (San Bartolomé, Tehuantepec, Oaxaca).

Similar to *aurifrons*, but both black and white dorsal bars decidedly narrower; crown and nape patches in male more frequently confluent; middle rectrices marked heavily with white; darker below; nuchal area orange or orange-red.

Pacific slope from southeastern Oaxaca to western Chiapas (Tonalá).

Centurus aurifrons frontalis (Nelson):

Melanerpes frontalis NELSON, Auk, 1900, p. 257 (San Vicente, Chiapas).

Similar to *polygrammus*, but dorsal bars heavier, almost as heavy as in *aurifrons*; rump and upper tail-coverts more or less marked with black; yellow of abdomen paler and more restricted; nape in female averaging paler; male with red crown patch averaging smaller, separated in most by a wide gray space from the orange nape. Male, wing 131–136 (133.6), tail 71–80 (74.4); female, wing 124.5–136 (130.6), tail 66.5–81 (72.6) mm. (measurements from Ridgway).

Chiapas, except extreme west and north, possibly into northwestern Guatemala.

Centurus aurifrons grateloupensis (Lesson):

Picus grateloupensis LESSON, Rev. Zool., 1839, p. 41 (Mexico).

Abdomen yellow to orange; white bars on dorsal surface narrower; nasal tufts orange or yellow; male with nape and crown red, middle rectrices black, in some with white on the inner webs.

This is an intermediate form between *aurifrons* and *veraecrucis*.

Extreme southern Tamaulipas (Altamira) south to central Veracruz (Mirador, Jalapa, Motzorongo) and eastern Puebla (Metlatocuca).

Centurus aurifrons veraecrucis (Nelson):

Melanerpes dubius veraecrucis NELSON, Auk, 1900, p. 259 (Coatzacoalcas, Veracruz).

Abdomen orange-red to red; white bars on dorsal surface much narrowed; crown and nape in male bright red, usually confluent though sometimes partly or wholly separated by gray; nasal tufts red; lower surface darker. Wing, male, 122–133 (126.9); female, 118–134.5 (124.7) mm. (measurements from Ridgway).

Specimens from Frontera, San Juan Bautista, and Montecristi, Tabasco, and Tila, Chiapas, are lighter below, thus showing approach to *dubius*. Skins from Guichicovi and Tuxtepec, Oaxaca, also are paler below, and are orange-red on the abdomen, thus showing transition to *santacruzii*.

South-central Veracruz (Tres Zapotes and Paso Nuevo) to Tabasco and northern Chiapas. Possibly to north central Guatemala, west of Petén. (There are five specimens in the National Museum, all marked Guatemala, with no definite locality.)

Centurus aurifrons dubius (Cabot):

Picus dubius CABOT, Proc. Boston Soc. Nat. Hist., vol. 1, 1844, p. 164 (Uxmal, Yucatán).

Generally similar to *veracruensis* but under surface distinctly paler, and averaging slightly larger; abdomen bright poppy red; crown and nape bright red with no gray bar. Wing, male, 130–137 (133.3); female, 123–132 (127.2) mm. (measurements from Ridgway).

Campeche and Yucatán to Petén and northern British Honduras (limit to the south uncertain).

Centurus aurifrons leei Ridgway:

Centurus leei RIDGWAY, Proc. Biol. Soc. Washington, vol. 3, Feb. 26, 1885, p. 22 (Cozumel Island, Yucatán).

Similar to *dubius* but much darker; rump and upper tail-coverts more or less barred with black; light frontal band sometimes lacking in male.

Cozumel and Meco Islands; Mujeres Island?

Centurus aurifrons canescens Salvin:

Centurus canescens SALVIN, Ibis, 1889, p. 370 (Ruatán Island, Honduras).

Similar to *dubius*, but white dorsal bars wider, outer webs of inner primaries spotted definitely with white.

Ruatán and Barburat Islands.

Centurus aurifrons santacruzii Bonaparte:

Centurus Santa Cruzei BONAPARTE, Proc. Zool. Soc. London, 1837, p. 116 (Guatemala).

Abdomen deep yellow, this color being darker and more extensive than in *grateloupensis*; differing further from that race in darker ventral surface, and, on the average, in slightly narrower white bars above; ordinarily with more white in the tail; averaging paler below than *veracruensis*; nuchal area usually red. Wing, male, 124.5–142 (131.8); female, 122.5–141.5 (130.2) mm. (measurements from Ridgway).

Some individuals vary to orange or orange-red on the abdomen. The nasal tufts are orange, about as in *grateloupensis*. Specimens from Santo Domingo in southeastern Oaxaca are of doubtful status. They resemble this race but from their location are more probably intermediate between *polygrammus* and *veracruensis*. More material is needed to settle this point.

Southwestern Chiapas (Finca Juarez) south through central and eastern Guatemala and El Salvador to northern Nicaragua.

Centurus aurifrons pauper Ridgway:

Centurus santacruzi pauper RIDGWAY, Proc. U. S. Nat. Mus., vol. 10, Aug. 6, 1888, p. 582 (Trujillo, Honduras).

Similar to *santacruzi*, but white dorsal bars averaging slightly narrower; size averaging slightly smaller. Wing, male, 117.5–131 (123.7); female, 115.5–123 (119.5) mm. (measurements from Ridgway).

The Caribbean slope of Honduras, ranging possibly north to Belize, British Honduras.

Centurus aurifrons insulanus Bond:

Centurus santa-cruzi insulanus BOND, Proc. Acad. Nat. Sci. Philadelphia, vol. 88, Aug. 14, 1936, p. 360 (Utila Island, Honduras).

Similar to *pauper* in color of abdomen, but with forehead and superciliary region whiter; upper parts more extensively barred with white; larger. Wing, male, 130–138; female, 127–128 mm. (measurements from Bond).

Utila Island, Honduras.

Centurus hoffmanni of Costa Rica and Nicaragua is generally similar to *Centurus aurifrons frontalis* but has the tail proportionately shorter, the size decidedly smaller, the under surface darker with the yellow on the abdomen darker and more extensive, the lower rump and upper tail-coverts usually without black markings, and the white on the middle rectrices reduced. The male has the red crown patch averaging larger and usually confluent with the orange of nape. Measurements, taken from Ridgway, are as follows: Male, wing 116.5–125 (120), tail 53–61.5 (57); female, wing 112–125.5 (117.8), tail 50–60.5 (54.9) mm.

While closely related to the *aurifrons* group, this woodpecker differs sufficiently in the relative length of the tail when compared to the wing to be held as specifically distinct. It is generally similar in appearance to the subspecies *aurifrons*, *polygrammus*, and *frontalis* but is isolated from the nearest of these by the intervention of the very different *Centurus aurifrons santacruzi*. In boldness of dorsal pattern, it is strongly suggestive of typical *aurifrons*.

Family DENDROCOLAPTIDAE

DENDROCINCLA ANABATINA ANABATINA Sclater

Dendrocincla anabatina P. L. SCLATER, Proc. Zool. Soc. London, May 1859, p. 54, pl. 150 (Omoa, Honduras).

One of the rarer forest birds of the region, this form is represented by skins from near Tres Zapotes, March 10 and April 14, 1939, and January 19, 1940, and from near 2,000 feet elevation on Cerro de Tuxtla, March 29 and May 11, 1940. I found them in heavy forest, ordinarily rather low down, climbing over the tree trunks. They uttered high-pitched calls.

Three specimens in the National Museum series from Pigres and Buenos Aires, southwestern Costa Rica, and from Chiriquí appear indistinguishable from skins from Nicaragua and Guatemala to southeastern Mexico, so that I see no basis for recognizing *Dendrocincla anabatina saturata*, described by Carriker and recognized by Ridgway and Hellmayr. The form *typhla* of Yucatán is distinct in its paler coloration.

SITTASOMUS GRISEICAPILLUS SYLVIODES Lafresnaye

Sittasomus sylvioides LAFRESNAYE, Rev. Mag. Zool., 1850, p. 590 (State of Veracruz, Mexico²³).

Four specimens were obtained by Carriker on Cerro de Tuxtla March 29 and April 16, and on Volcán San Martín May 7. They were found in the forest at 2,000 to 2,500 feet altitude.

Specimens taken by Nelson and Goldman at Metlatoyuca, Puebla, are slightly paler than birds from Veracruz.

LEPIDOCOLAPTES AFFINIS AFFINIS (Lafresnaye)

Dendrocolaptes affinis LAFRESNAYE, Rev. Zool., April 1838, p. 100 (Mexico).

Carriker shot two on April 17 and 20, 1940, in heavy forest above 3,500 feet on Volcán San Martín.

XIPHORHYNCHUS FLAVIGASTER EBURNEIROSTRIS (Des Murs)

Dryocopus eburneirostris DES MURS, Iconographie ornithologique, July 1847, pl. 52, with text (Realejo, Nicaragua).

Swainson's woodhewer is one of the common forest birds in the lowlands around Tres Zapotes, and it ranged to at least 1,000 feet elevation on the Sierra de Tuxtla. Found singly or in pairs, usually in heavy forest, it was the most abundant species of its family. Occasionally it ranged through scrubby second growth, or came even into clumps of trees scattered through the pastures. It is quite active in moving over the tree trunks, climbing sometimes awkwardly and

²³ Designated by Bangs and Peters, Bull. Mus. Comp. Zool., vol. 68, 1928, p. 392.

sometimes gracefully, ordinarily going steadily up, though when it desired it moved downward like a woodpecker by simply raising the tail and dropping down a few inches at a time. Occasionally I saw one work around the underside of horizontal limbs. At the end of March they began to sing a high, whistled song. Sometimes this was varied by a low, tremulous whistle, given as the birds rested with raised crests. They appear to be strictly resident. An excellent series was taken near Tres Zapotes between March 7 and April 10, 1939, and January 19 and March 9, 1940. Carriker shot two on Cerro de Tuxtla on March 13 and May 8. There is considerable variation among them from light to dark.

For use of the name *eburneirostris* for this form, long known as *flavigaster*, the reader is referred to van Rossem's finding³⁴ that Swainson's type of *flavigaster* is an example of the race described later by Nelson as *megarhynchus*, so that *flavigaster* must transfer to this large-billed subspecies. The name *eburneirostris* thus becomes current again for the form extending from southeastern Mexico through Central America.

DENDROCOLAPTES CERTHIA SANCTI-THOMAE (Lafresnaye)

Dendrocops Sancti-Thomae LAFRESNAYE, Rev. Mag. Zool., 1852, p. 466 (Santo Tomás, near Omoa, Honduras).

Carriker shot three at about 2,000 feet elevation on Cerro de Tuxtla on March 11 and 29 and April 9, 1940. Two were high up in large trees, while the third had come down into the shrubbery above a band of hunting ants.

Family FURNARIIDAE

AUTOMOLUS OCHROLAEMUS CERVINIGULARIS (Sclater)

Anabates cervinigularis P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 288 (Cordóba, Veracruz).

In the Sierra de Tuxtla, Carriker found this bird fairly common, obtaining specimens on Cerro de Tuxtla on March 11, 19, and 29 and April 3, and on Volcán San Martín on April 22. He shot two near Tres Zapotes on January 17 and April 12. These birds were found in thick undergrowth in the forest and were rather shy.

While I have followed Hellmayr's recent treatment, I am not certain that true *ochrolaemus* is conspecific with *cervinigularis* and its allies. The freshly taken birds from the present collection appear darker on the flanks and back than older skins, a difference possibly due to age, though it may be of a subspecific nature.

³⁴ Proc. Biol. Soc. Washington, vol. 52, Feb. 4, 1939, p. 15.

XENICOPSOIDES MONTANUS VARIEGATICEPS (Sclater)

Anabazenops variegaticeps P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 289 (Córdoba, Veracruz).

Carriker shot a pair at about 3,700 feet altitude on April 20, 1940, on Volcán San Martín and reported two others in the same locality. They were found in high undergrowth in very heavy forest.

SYNALLAXIS ERYTHROTHORAX FURTIVA Bangs and Peters

Synallaxis erythrothorax furtiva BANGS and PETERS, Bull. Mus. Comp. Zool., vol. 67, Jan. 1927, p. 476 (Presidio, Veracruz).

One of the common species in the lowland area, these birds range in thickets or in the low, dense growth at the border of monte. From such protection they come out under cover of grass to feed in the open, usually on the ground, but retreat at once when alarmed. Carriker saw a few in the coastal sand dunes, and found them common among the low thickets scattered over the savannas near Tlacotalpam.

As they fly up with tilting flight or move about in the brush, they often appear very bright colored, suggesting little finches. The note is querulous with a curious cadence, often heard when the birds themselves are under cover. Their large stick nests are placed 5 to 7 feet from the ground. On April 13 I saw one carrying twigs.

The series taken comes from near Tres Zapotes on the following dates: March 7, 8, 9, 13, 15, 18, and 27 and April 3 and 13, 1939; January 17 and 18 and March 6, 8, and 18, 1940. The race *furtiva*, as represented in this good series, is distinguished from typical *erythrothorax* of eastern Guatemala by duller-colored flanks and sides, with the lighter area of the abdomen more extended laterally.

XENOPS MINUTUS MEXICANUS Sclater

Xenops mexicanus P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 289 (Córdoba, Veracruz).

Carriker shot a male in the forest southeast of Tres Zapotes on April 12, 1940.

Family FORMICARIIDAE**GRALLARIA GUATIMALENSIS GUATIMALENSIS** Prévost and Des Murs

Grallaria guatimalensis PRÉVOST and DES MURS, Voyage autour du monde sur . . . la *Vénus*, Zool., Atlas, livr. 1, 1846 (1842), pl. 4 (Guatemala).

The antpittas, always shy, elusive forest birds, are difficult to secure. In 1939 I had no hint of their presence, but the following year Carriker obtained three in the forested area southeast of Tres Zapotes,

on April 11, and two at 1,500 feet elevation on Cerro de Tuxtla, May 5 and 9.

Griscom³⁵ considers that the birds from southeastern Mexico are to be united with those of Guatemala under the one name *guatemalensis*. The material in the National Museum shows considerable variation in depth of color, the four adult Guatemalan specimens available averaging darker, and the seven from Veracruz and Tabasco paler. In view of the more extensive series examined by Griscom, I have followed his findings.

FORMICARIUS ANALIS MONILIGER Sclater

Formicarius moniliger P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 294 (Córdoba, Veracruz).

The series of nine specimens was secured as follows: Near Tres Zapotes, March 14 and April 7, 1939, and April 1, 1940; lower slopes of Cerro de Tuxtla, May 5, 6, and 9; and at about 3,000 feet elevation on Volcán San Martín, April 18 and 21. They are probably much more common than the relatively few that are seen indicate, as they live on the ground in heavy jungle, where they remain almost entirely under cover. About the middle of March at Tres Zapotes they began to call, uttering a whistled note repeated quickly with varying rapidity. They were heard most often on days of rain. They responded readily to a whistled imitation of the call but usually remained where they could see but could not be seen. When they do appear, they walk or run like thrushes on the ground, with raised tail, advancing a few steps and then stopping in shadow or beneath the shelter of leaves to look about. One day at Arroyo Corredor, as I called, one walked out finally around the base of a palm only 10 feet away, and as it saw me it flew with a rattling noise of its short wings to a perch on a branch 6 feet from the ground.

Carriker heard them frequently in May on the lower slopes of Cerro de Tuxtla and on San Martín.

THAMNOPHILUS DOLIATUS INTERMEDIUS Ridgway

Thamnophilus intermedius RIDGWAY, Proc. U. S. Nat. Mus., vol. 10, Aug. 1888, p. 581 (Trujillo, Honduras).

This, the most common of the ant-shrikes, was taken near Tres Zapotes on March 11, 14, 16, and 24, 1939, January 29, February 22, March 14 and 25 and April 5, 1940, at Tlacotalpam on February 7, and in the coastal sandhills near El Conejo on May 15. It ranged in areas of dense brush to the base of the Tuxtla Mountains but did not enter the forest that covers the slopes of this range. As just stated,

³⁵ Bull. Amer. Mus. Nat. Hist., vol. 64, 1932, p. 237.

it is an inhabitant of the densest coverts, where its rattling notes are heard constantly but where the birds themselves keep carefully under cover. The male in calling rises to full height and erects his crest, while the effort of uttering the notes shakes his body visibly.

As Peters has written,³⁶ the proper subspecific name for this ant-shrike is not *mexicanus* Allen (1889) but *intermedius* Ridgway (1888).

TARABA MAJOR MELANOCRISsus (Sclater)

Thamnophilus melanocrisissus P. L. SCLATER, Proc. Zool. Soc. London, Aug. 1860, p. 252 (Santecomapam, Orizaba, Veracruz).

The six obtained were collected in the vicinity of Tres Zapotes on March 24, 1939, and January 26, February 23, March 6, 7, and April 1, 1940. I saw one near Boca San Miguel. They inhabit the densest of thickets and masses of vines, where it is difficult to locate them when their strange notes are heard.

It seems reasonable to follow Griscom's treatment of this form³⁷ in separating it from *T. m. transandinus* of distant Ecuador. The three males in the present series have the under tail-coverts without white.

Family COTINGIDAE

ATTILA SPADICEUS FLAMMULATUS Lafresnaye

Attila flammulatus LAFRESNAYE, Rev. Zool., 1848, p. 47 (Veracruz, Mexico).

This forest bird was fairly common, specimens coming from Tres Zapotes March 19, 31, and April 10, 1939, and March 3, 7, and April 1, 1940, and from Cerro de Tuxtla March 11. Carriker recorded it also on Volcán San Martín. One I shot as it perched in an erect, flycatcherlike attitude on an open limb in the center of a tree. Another rested in the dense shadow beneath a heavy mass of vines in a tree top, and another in tree tops in open gallery forest near water. As they often remain quiet among leaves, they are easily overlooked.

PACHYRAMPHUS MAJOR MAJOR (Cabanis)

Bathmidurus major CABANIS, Arch. für Naturg., vol. 13, 1847, p. 246 (Jalapa, Veracruz).

Carriker shot a male on March 4, on the trail between Tres Zapotes and Hueyapa, and a female on April 17 high in a tree in heavy forest between 3,000 and 4,000 feet elevation on Volcán San Martín. The species apparently is rare in this region.

³⁶ Bull. Mus. Comp. Zool., vol. 69, 1929, p. 439.

³⁷ Bull. Amer. Mus. Nat. Hist., vol. 64, 1932, pp. 232-233.

PLATYPSARIS AGLAIÆ SUMICHRASTI Nelson

Platypsaris aglaiae sumichrasti NELSON, Auk, 1897, p. 52 (Otatitlan, Veracruz).

Near Tres Zapotes and Hueyapa this was among the most common birds, so that a good series was obtained between March 14 and April 13, 1939, and February 26 and March 27, 1940. Carriker found a few around Tlacotalpam, where he shot one February 7, and saw one at El Conejo near the coast. They were known as the *copetón negro*. They ranged in groves and to some extent in forest, where they were found in the tops of the taller trees. It was common to encounter them along trails in second growth, and in low trees standing in thickets. On April 11 I saw two nests and the following day recorded a male carrying nesting material. The structures were large, untidy masses of plant material, nearly as large as a basketball, placed on the free ends of slender limbs in trees growing in fairly open localities. They were conspicuous, but because of their location on slender branches 25 feet or so from the ground they were safe. About the first week in April, it appeared to me, these birds became less common than they had been during March.

TITYRA SEMIFASCIATA PERSONATA Jardine and Selby

Tityra personata JARDINE and SELBY, Illustrations of ornithology, vol. 1, pt. 2, June 1827, pl. 24 (Real del Monte, Hidalgo).

A fairly common bird, this species is represented by skins from Tres Zapotes, March 11, 14, and April 6, 1939, and February 27 and March 5, 1940. These are heavy-bodied birds, found usually in little groups of three or four individuals, sometimes of as many as half a dozen, that travel over the monte with bounding flight to alight on open limbs in the taller trees. Those that bear drupes are attractive to them, and here they hop about in the branches rather slowly and sluggishly to feed. The natives call them *borraquitos*, little lambs, probably because of their chunky forms and light colors. The notes are most curious, consisting of grunting, squeaking calls. On April 10 I recorded a male examining holes in palm trees standing in an old field, and two days later noted another of the same sex carrying a leaf into one of these openings. Ramón said that old woodpecker holes made the usual nesting places.

ERATOR INQUISITOR FRASERII (Kaup)

Psaris Fraserii KAUP, Proc. Zool. Soc. London, 1851 (Oct. 1852), p. 47, pls. 37, 38 (Veracruz, Mexico²³).

²³ Designated by Hellmayer, Publ. Field Mus. Nat. Hist., zool. ser., vol. 13, pt. 6, 1929, p. 223.

Apparently this species is uncommon, as only three were taken. On March 21, 1939, I shot one from a tree top near camp at Tres Zapotes. On March 27, 1940, Modesto, Carriker's assistant, killed two from tall trees near the arroyo at Hueyapa. Unless seen near at hand they may be confused with the more abundant *Tityra semifasciata personata*.

While like *Tityra* in general style of coloration, this species in its various races differs so distinctly in closely feathered loreal and orbital region, more swollen bill, with less strongly uncinate tip, longer gonys, which is much greater than the mandibular rami, and in the taxaspidian type of scutellation of the tarsus, that it definitely merits treatment as a distinct genus.

Family TYRANNIDAE

SAYORNIS PHOEBE (Latham): Eastern Phoebe

Muscicapa Phoebe LATHAM, INDEX ornithologicus, vol. 2, 1790, p. 489 (New York).

At Tlacotalpam on February 5 Carriker shot a female from a wire fence in a pasture near a patch of thorn scrub.

PYROCEPHALUS RUBINUS BLATTEUS Bangs

Pyrocephalus rubineus blatteus BANGS, Proc. Biol. Soc. Washington, vol. 24, June 23, 1911, p. 189 (Sabune district, British Honduras).

Vermilion flycatchers, known here as the *cardenal*, were taken at Tres Zapotes on March 17 and April 7, 1939, and January 17, March 27, and April 2, 1940, and at Tlacotalpam on February 5 and 20, 1940. They were found in open pastures, being always present in the little savanna near camp, and were especially common in the savanna area in the section called Para Madera. In March and April I found them often in pairs. Males were seen displaying during this period, and Carriker saw a fully fledged young bird near Tlacotalpam on May 16. He recorded the species as common in the coastal area at El Conejo.

Unexpectedly, the series taken is of the southern race, as indicated by wing measurements of 74 to 77 mm. for males and 72.7 to 73.4 for females. The bills in some are equal only to the maximum in *P. r. mexicanus* but in others are definitely larger. The race is one known previously north only to Yucatán, Campeche, and Petén.

MUSCIVORA FORFICATA (Gmelin): Scissor-tailed Flycatcher

Muscivora forficata GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 931 (Mexico).

The *tijerilla* seemingly is a migrant at Tres Zapotes, as neither Carriker nor I observed it there until the latter part of March. I recorded the first one March 25, and on March 27 I saw two resting in a dead tree that stood in water at Laguna del Tular. On April 1 I

collected one and on April 4 saw another. On April 11 half a dozen came to feed on the fruits of a palo mulato, and two that I shot were extremely fat. On April 15 I noted two at Boca San Miguel. In 1940 Carriker recorded about a dozen, collecting two on March 25. Near El Conejo on the coast he saw a pair flying overhead in February and shot a female there on May 15. They may therefore winter in that area.

MUSCIVORA TYRANNUS MONACHUS (Hartlaub)

Tyrannus (Mitrvulus) monachus HARTLAUB, Rev. Zool., vol. 7, 1844, p. 214 (Guatemala).

In 1939 I saw several at Tlacotalpam on March 6, and the following year in February Carriker found a fair number there mainly on the marshes surrounding a shallow pond west of town. He collected a female on February 8. At Tres Zapotes on April 11, 1939, I shot two, male and female, from four or five that came with the more abundant scissor-tailed flycatchers to feed on the fruit of the palo mulato. These were the first that I had seen here, so that it was my impression that they were moving into the region from elsewhere. Whether this movement was from near or far it is not possible to say. The two taken were near breeding. While specimens of *Muscivora forficata* secured with them were very fat, these two were in ordinary body condition. The species is known as *tijerilla*.

TYRANNUS MELANCHOLICUS CHLORONOTUS Berlepsch

Tyrannus chloronotus BERLEPSCH, Ornith., vol. 14, 1907, p. 474 (Temax, Yucatán).

The small series obtained came from Tres Zapotes on March 20 and April 3, 8, and 13, 1939, and April 6, 1940, with one from Tlacotalpam shot on February 15, 1940. These average lighter, less yellowish across the breast band, and are very slightly paler yellow than skins from Yucatán and farther southward, showing in this a beginning of intergradation with *couchii* of more northern distribution. In size, however, and in darker dorsal color, these belong with *chloronotus*.

These kingbirds were common in open areas across the lowlands to the base of the mountains. They range mainly in pastures and old milpas and the borders of cultivated fields, occasionally flying across to alight in the tops of taller trees projecting through the monte. They rest on open perches as the tops of stakes, open branches, or the tops of trees and bushes, and often are a little wild and difficult to approach. The flight is direct and is performed with rapidly fluttering wings. The call notes are high in pitch and rather insignificant in volume. It appeared to me that they became some-

what less common about the first of April, so that part of those present earlier may have spread to other areas for nesting.

TYRANNUS MELANCHOLICUS COUCHII Baird: Couch's Kingbird

Tyrannus couchii BAIRD, Rep. Pac. R. R. Surv., vol. 9, 1858, pp. 170, 175 (Nuevo León).

Among the specimens from Tres Zapotes, there is one male taken by Carriker on March 18, 1940, that is unquestionably of this race, here as a migrant. The wing in this bird measures 125.2 and the tail 98.7 mm. The wing and tail feathers have the lighter brown color characteristic of *couchii*, and the other colors agree.

LEGATUS LEUCOPHAIUS VARIEGATUS (Sclater)

Elania variegata P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 297 (Córdoba, Veracruz).

From the observations of our two seasons it appears that this flycatcher is not a permanent resident here. I did not record it in 1939 until April 11, when I collected two and saw several more. On April 13 and 15 a number of others were seen in places that I had had under observation since early March without noting this species. The following year Carriker secured four near Hueyapa on April 8, and found them common after that date, both through the lowlands and over the lower slopes of the Sierra de Tuxtla. When first found in April, the sexual organs showed activity. The evidence is rather definite that they had come into this area to breed.

They are quiet birds of slow movement, found usually among the upper branches of the trees. In pasture areas they are often at low elevations, as many of the trees are small, but in open forests they may be high overhead. They prefer open growth. At times they rest upright, turning the head from side to side, and then suggest cedar waxwings. Again, they incline forward so that with their rather heavy bodies, they resemble finches. The song is a double-noted sibilant whistle that may be represented by the syllables *whew-cas*.

MYIODYNASTES LUTEIVENTRIS LUTEIVENTRIS Sclater

Myiodynastes luteiventris P. L. SCLATER, Proc. Zool. Soc. London, 1859, p. 42 (Orizaba, Mexico).

April 1, 1939, marked the date of arrival of this migrant form at Tres Zapotes, as on that day I saw two and collected an adult male. They were found at the edge of forest in a cut-over area, where they rested rather high in open trees. On April 12 I shot another male from a dead tree in a weed-grown milpa. Both are good examples of the typical race.

MYIODYNASTES MACULATUS INSOLENS Ridgway

Myiodynastes audax insolens RIDGWAY, Manual of North American birds, 1887, pp. 332, 502 (Mirador, Veracruz, Mexico).

The only specimen is a female, taken at 2,500 feet elevation on Volcán San Martín, April 22, 1940. Carriker found a pair here in a huge tree standing in an old clearing in the forest.

MEGARYNCHUS PITANGUA MEXICANUS (Lafresnaye)

Saurophagus mexicanus LAFRESNAYE, Rev. Mag. Zool., 1851, p. 473 (Mexico).

These birds were fairly common along the border of woodland and at times in the forest itself, ranging in leafy trees, usually where there was a little shade. Two were taken on March 16 and 27, 1939. On April 7 I recorded one carrying nesting material.

MYIOZETETES SIMILIS TEXENSIS (Giraud)

Muscicapa texensis GIRAUD, A description of sixteen new species of North American birds, 1841, (p. 5), pl. 1 ("Texas").

The present form is widely distributed through the lowland areas in the open limbs of high tree tops in the forests, and in groves, scattered trees, and shrubbery elsewhere. Carriker recorded its absence in the Sierra de Tuxtla so far as his observations extended. Specimens were taken at Tres Zapotes in 1939 on March 9, 23, and April 11 and 13, and in 1940 on January 19, 25, and February 22. Carriker shot one at El Conejo on February 10 and one at Tlacotalpam on May 16. He says that they were nesting in May and describes the nest as built of dry grass, of large size, and domed with an entrance in the side, like that of *Pitangus*. I found these flycatchers feeding at the drupes of the palo mulato tree.

The name for this race has been one that recently has been under question. Bonaparte in listing a collection of birds from Guatemala³⁹ had one of these birds which he thought was representative of a species that had been named *Tyrannula superciliosa* by Swainson.⁴⁰ Bonaparte therefore listed his Guatemalan specimen as "*Tyrannus superciliosus*, Swains." following the name by a brief description and measurements in Latin. Swainson's species, however, was a different form, somewhat similar in color and size, his name being considered now a synonym of *Conopias trivirgata trivirgata*. Nelson,⁴¹ and later Peters,⁴² have considered that the *superciliosus* of Bonaparte is to be accepted as valid, and therefore the name to be used for the race of *Myiozetetes* that has been generally called *texensis*, since

³⁹ Proc. Zool. Soc. London, 1837 (June 14, 1838), p. 118.

⁴⁰ *Tyrannula superciliosa* Swainson, Ornithological drawings, pt. 4, pl. 46, 1836 (Brazil).

⁴¹ Auk, 1900, p. 124.

⁴² Bull. Mus. Comp. Zool., vol. 69, Oct. 1929, p. 448.

it antedates *texensis* in publication. Hellmayr⁴³ and Zimmer⁴⁴ recently have held that this is incorrect, which seems to me to be the case. Zimmer, in support of his reasoning, cites Article 31 of the International Rules of Zoological Nomenclature, which provides that names based on a mistake in identification are not to be used for the form wrongly identified. It appears to me that Opinion 14 by the Commission also has definite bearing in so far as it deals with the species that it discusses. It is evident that Bonaparte's use of *supercilliosus* was through error in identification of his specimens and that it was Swainson's name that he used through this error.

PITANGUS SULPHURATUS GUATIMALENSIS (Lafresnaye)

Saurophagus Guatimalensis LAFRESNAYE, Rev. Mag. Zool., 1852, p. 462 (Guatemala).

We secured specimens of this noisy, conspicuous bird at Tres Zapotes on March 24 and 31 and April 7, 1939, and January 20 and 25, 1940. Carriker in the latter year obtained examples at Tlacotalpan on February 5 and May 16 and 17. They ranged in open pastures and fields, though in the heat of the day they often entered the woodland. On March 14 I recorded one displaying with raised crest and quivering wings, and on March 17 one was carrying nest material to a crotch 25 feet from the ground in a tree growing in the open near Laguna del Tular. On April 13 I examined a completed nest at the Arroyo Tepanaguasapan, a large, untidy structure of grass and other plant stems, domed and with a large opening in the side through which I could touch the eggs. It was placed 8 feet from the ground in a little tree growing in the open.

In identifying these specimens, I have followed van Rossem's recent treatment of this group,⁴⁵ though with some misgivings, as to this procedure. Specimens in the National Museum from Panamá to Honduras are appreciably darker, except that on the Pacific slope from northwestern Costa Rica to western Nicaragua they are a little grayer. Birds from Mexico north of southern Veracruz and Oaxaca are lighter, with a considerable region between these two areas in which individuals of more or less mixed character occur. In the northern group skins from southern Texas and Nuevo León to southern Veracruz have the frontal area more extensively white and are called *texanus*. Specimens from Zacatecas and interior Jalisco south in the region west of Veracruz to Oaxaca are a little darker above and below and are recognized as *derbianus*. Birds of northwestern Mexico from southern Sonora to the coastal area of Nayarit are like *derbianus* but average smaller and are called *palliatus*.

⁴³ Publ. Field Mus. Nat. Hist., zool. ser., vol. 13, 1927, p. 144.

⁴⁴ Amer. Mus. Nov., No. 963, 1937, pp. 20-21.

⁴⁵ Trans. San Diego Soc. Nat. Hist., vol. 9, Apr. 30, 1940, pp. 80-84.

The specimens from Tres Zapotes and Tlacotalpam are variously intermediate but seem nearer the *guatemalensis* type in slightly darker color above and below. There is much individual variation in depth of hue, and it must be recognized that as these are birds that live much in the open under an intense sun they are subject to definite fading, a fact that makes comparisons difficult where the differences that may exist are slight at best. The races *guatemalensis* and *palliat* are smaller when compared to *texanus* and *derbianus*. The alleged differences in size and form of bill in the various races to me are insignificant or not apparent.

MYIARCHUS CRINITUS BOREUS Bangs: Northern Crested Flycatcher

Myiarchus crinitus boreus BANGS, Auk, Apr. 1898, p. 179 (Scituate, Mass.).

Carriker shot the only one obtained on the lower slopes of Cerro de Tuxtla on May 7, a late date for the species.

I heard one calling at the camp at Tres Zapotes on March 19, 1939, and recorded others on March 20, 21, and 22. Whether these were the northern or the southern form is, of course, unknown.

MYIARCHUS CINERASCENS CINERASCENS (Lawrence): Ash-throated Flycatcher

Tyrannula cinerascens LAWRENCE, Ann. Lye. Nat. Hist. New York, vol. 5, Sept. 1851, p. 121 (western Texas).

The only one secured is a female, shot by Carriker on February 10, 1940, in the sandhills near the coast at El Conejo. Apparently this species is subject to some fading, since this specimen, in fresh plumage, has clearer yellow and gray tones below than skins obtained later in the year in the United States.

MYIARCHUS TYRANNULUS NELSONI Ridgway: Mexican Crested Flycatcher

Myiarchus tyrannulus nelsoni RIDGWAY, U. S. Nat. Mus. Bull. 50, pt. 4, 1907, p. 903 (Altamira, Tamaulipas).

A common species that is represented by the following specimens: Tres Zapotes, March 15, 18, 25, and 27 and April 5, 1939, and March 18, 25, and 27 and May 2, 1940; El Conejo, May 15, 1940. Carriker did not obtain it during winter, while after the middle of March it was common. It appears that it may be migratory, at least in part.

I found these flycatchers in fairly open areas in the forest or along lines of trees left standing at the borders of cultivated fields. The common notes are louder than those of its smaller relative in this area and were more like those of *Myiarchus crinitus*. I heard it give another call that suggested in tone the whistle of the Bartramian sand-piper. The specimen taken on May 2 is decidedly paler below than the others but offers no other peculiarities. It is in well-worn plumage.

MYIARCHUS TUBERCULIFER LAWRENCEII (Giraud)

Muscicapa lawrenceii GIRAUD, A description of sixteen new species of North American birds, 1841, p. 7, pl. 2, fig. 1 (Nuevo León, Mexico ⁴⁶).

Specimens were taken in the vicinity of Tres Zapotes from March 7 to April 5, 1939, and January 19 to March 25, 1940, on Cerro de Tuxtla on May 9, and at El Conejo near the coast on February 10 and 12. Two skins from El Conejo are about typical of *lawrenceii*, the wing in a male measuring 85.9 mm. and in a female 80.8. The rest of the series is definitely on the boundary line toward *connectens* of farther south, there being only one male taken at Tres Zapotes on March 4 that has the wing 85.5. It is possible that this may be a migrant from some point farther to the north. In eight other males the wing ranges from 82.7 to 83.8, while in three others it is 78, 81, and 82 mm. respectively. Two females from Tres Zapotes have the wing 75 and 79.2 mm., while in one from Cerro de Tuxtla it is 79.2 mm. The close approach to typical *connectens* is easily evident.

The *copetona* or *copetoncita* was one of the common birds that ranged both in the forest and along the lines of trees and shrubs bordering the fields and trails. In woodland it was found in more open branches of the tree tops. Individuals came constantly to the small trees bordering our campsite. By March 24 the breeding season was near, as the birds became more vociferous, and on April 5 I shot a male in breeding condition at the Cerro Nestepe. The ordinary call was a high-pitched *whee-ee-ee*, and I heard them also giving a song of varied notes. Carriker found them ranging to 2,000 feet on the Cerro de Tuxtla.

EMPIDONAX FLAVIVENTRIS (Baird and Baird): Yellow-bellied Flycatcher

Tyrannula flaviventris W. M. BAIRD and S. F. BAIRD, Proc. Acad. Nat. Sci. Philadelphia, vol. 1, Sept. 18, 1843, p. 283 (Carlisle, Pa.).

Six specimens were shot near Tres Zapotes on March 7, 16, and 17, April 10, 1939, and March 3 and April 8, 1940. They were found low down at the borders of thickets, in open woods, and occasionally in heavy forest.

EMPIDONAX TRAILLII TRAILLII (Audubon): Traill's Flycatcher

Muscicapa Traillii AUDUBON, Birds of America, folio ed., vol. 1, 1828, pl. 45 (prairie lands of the Arkansas River).

Carriker shot a late migrant male in a clump of shrubbery at El Conejo May 15.

⁴⁶ Designated by Miller and Griscom, Amer. Mus. Nov., No. 159, 1925, p. 7.

EMPIDONAX MINIMUS (Baird and Baird): Least Flycatcher

Tyrannula minima W. M. BAIRD and S. F. BAIRD, Proc. Acad. Nat. Sci. Philadelphia, vol. 1, Sept. 18, 1843, p. 284 (Carlisle, Pa.).

This is the most common of the flycatchers from the north, specimens having been taken as follows: Near Tres Zapotes, March 17, 20, 23, 28, and 31, and April 3 and 11, 1939, and January 18 and 19, March 14, and 27, and April 6 and 11, 1940; near Tlacotalpam, February 15. Specimens in full molt were shot on March 28 and April 3 and 8. These flycatchers were found usually in quiet spots out of the wind in the shelter of thickets and at the edge of forest. All were silent.

EMPIDONAX FLAVESCENS IMPERTURBATUS Wetmore

Empidonax flavescens imperturbatus WETMORE, Auk, vol. 59, Apr. 1942, p. 267 (Volcán San Martín, Sierra de Tuxtla, Veracruz, Mexico).

Carriker found this flycatcher fairly common in the smaller trees and undergrowth in the virgin forest on Volcán San Martín, where it ranged from 3,000 feet across the summit. It was quiet and rather shy. Four specimens were taken on April 16, 17, and 18, including two males and two females. This mountain marks the northern outpost for the species which has not been known before north of Chiapas.

EMPIDONAX ALBIGULARIS AXILLARIS Ridgway

Empidonax axillaris RIDGWAY, in Baird, Brewer, and Ridgway, History of North American birds, vol. 2, Jan. 1874, p. 363 (Orizaba, Veracruz).

The only specimen is a male taken by Carriker near Tlacotalpam on February 20, 1940. It was found at the border of a clump of thorn trees in a pasture north of the town and was the only one seen. This bird has the following measurements: Wing 62.0, tail 55, culmen from base 13.4, tarsus 16 mm. It is marked by the buffy brown of the under wing coverts, edge of the wing, and tibia, differing in this respect from other species of the genus found here.⁴⁷

MYIOBIUS SULPHUREIPYGIUS SULPHUREIPYGIUS (Sclater)

Tyrannula sulphureipygia P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 296 (Córdoba, Veracruz).

Carriker found these interesting birds common on the lower slopes of Cerro de Tuxtla below 1,200 feet, more abundantly below 800 feet. They ranged in undergrowth and in the smaller forest trees, often in company with the bands of little forest birds so common in the American tropics. He secured specimens on March 11 and 29, April 9, and May 6 and 7. He did not record it on Volcán San Martín.

⁴⁷ For the latest treatment of this species, see Moore, R. T., Auk, 1940, pp. 379-383.

ONYCHORHYNCHUS MEXICANUS MEXICANUS (Sclater)

Muscivora mexicana P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 27, 1857), p. 295 (Córdoba, Veracruz).

These interesting flycatchers are inhabitants of the lower levels in densely shaded woodland where the wet forest floor is open. My first one I found on March 7, 1939, resting on an open perch in the dark shadow of a dense thicket in heavy monte on low wet ground, where it appeared only as a silhouette, though I recognized it immediately from the shape of the crest. On April 7 at the Arroyo Corredor I heard a clear, rather plaintive whistle of several notes and imitated it, and one of these birds came instantly to a perch before me 20 feet from the ground. I saw others in this same region, and on April 12 secured a pair. A male in flight suddenly hovered with rapidly beating wings while the crest was spread and thrown forward. It then whirled around and alighted. The birds decoyed readily to an imitation of their calls and evidently were pairing. Carriker shot one on January 22, 1940. None of the natives knew this bird in life.

PLATYRINCHUS CANCROMINUS Sclater and Salvin

Platyrhynchus cancrominus SCLATER and SALVIN, Proc. Zool. Soc. London, 1860, p. 299 (Choctum, Vera Paz, Guatemala).

Near Tres Zapotes this is a common resident species, so that we secured a good series from January to May. Carriker observed a few over the slopes of Cerro de Tuxtla, where it ranged to 1,500 feet elevation, taking specimens on May 6 and 9, 1940. In March and April I found them in pairs, low down near the ground, in bushes beneath the heaviest forest growths, where light was dim and shadows heavy. As the birds were quiet, only occasionally hopping through the twigs, there is little doubt that they were often overlooked. I heard explosive, petulant notes from them, and one, on March 29, fluttered its wings while calling. Carriker recorded that the nest was a tiny cup set in an upright fork 3 to 5 feet from the ground.

TOLMOMYIAS SULPHURESCENS CINEREICEPS (Sclater)

Cyclorhynchus cinereiceps P. L. SCLATER, Ibis, 1859, p. 443 (Oaxaca, Mexico).

Near Tres Zapotes I shot one on March 11, 1939, and Carriker obtained others here on February 23 and April 26, 1940, as well as one on the lower slopes of Cerro de Tuxtla May 7. The characteristic nest, made of blackish, fibrous rootlets suspended at the end of a slender branch was not uncommon, but the birds were hard to find. They ranged usually among the lower limbs in gallery forest, or less often in low, denser second growth.

The four specimens listed above, with two others in the Fish and Wildlife Service collection from Santa Lucrecia, Veracruz, average

slightly darker gray on the foreneck and upper breast than specimens from Oaxaca southward into Costa Rica.

TODIROSTRUM CINEREUM FINITIMUM Bangs

Todirostrum cinereum finitimum BANGS, Proc. Biol. Soc. Washington, vol. 17, May 18, 1904, p. 114 (San Juan Bautista, Tabasco, Mexico).

The six specimens were taken as follows: Tres Zapotes, April 11 and 13, 1939. January 18, 1940; Tlacotalpam. February 5, 7, and 16, 1940. Carriker saw it at El Conejo. It was found in thickets and low trees in the pastures and the borders of groves in masses of creepers where it worked actively with much flirting of the slender tail. Though rather rare at Tres Zapotes, it was common in the dense thorny scrub around Tlacotalpam. Two from the latter point are partially albino, one having a patch of white feathers on the posterior part of the crown, and the others the whole back of the head extensively white, with a large yellowish white patch in the center of the back.

TODIROSTRUM SYLVIA SCHISTACEICEPS Sclater

Todirostrum schistaceiceps P. L. SCLATER, Ibis, 1859, p. 444 (State of Oaxaca, Mexico).

Seven specimens were taken near Tres Zapotes on March 21, 25, and 30, 1939, and January 29, 1940. They were fairly common, though because of their tiny size they were difficult to see, and had it not been that I soon learned their calls I would have considered them rare. They ranged in tangles of vines and bushes in dense monte, often in company with *Oncostoma cinereigulare*, and usually when I succeeded in seeing them they were within a few feet of me. At any distance their tiny forms disappeared behind the leaves. They hopped about a great deal or fluttered short distances, ranging from near the ground to an elevation of 15 feet or so. The call, uttered in a nasal tone, was somewhat like that of *Oncostoma* but was quite characteristic.

ONCOSTOMA CINEREIGULARE (Sclater)

Todirostrum cinereigulare P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 295 (Córdoba, Veracruz).

This tiny flycatcher was fairly common near Tres Zapotes, so that it is represented by a small series taken from January 22 to April 1. Carriker secured two on Cerro de Tuxtla, one near the base of the mountain on April 3 and one at 1,500 feet on April 9. They range in densely shaded thickets and in heavy undergrowth in the forest, keeping always low down where they hop or flutter about or remain

motionless for considerable periods. They are so small and live in such obscure light that they are seen only by chance. In fact, they are usually found through their low, trilling, toadlike calls. I heard them often when I could not find them.

Examination of a good series substantiates what I have said elsewhere⁴⁸ with regard to variation in this bird, which, so far as I can see, cannot be divided into geographic races from material now at hand. Hellmayr⁴⁹ includes *Oncostoma olivaceum* (Lawrence) as a subspecies of *cinereigulare*, but I believe, with Peters, that it is specifically distinct. We have an excellent series of *olivaceum* from Panamá in which no intergradation is evident, and further have one typical skin of *C. cinereigulare* taken by J. McLeannan that is marked "Lion Hill, near Aspinwall," Lion Hill being the type locality of *olivaceum*. The two apparently occur there in the same general region, with no indication of intergradation. We have four excellent *olivaceum* collected by E. A. Goldman at the type locality.

ELAINEA FLAVOGASTER SUBPAGANA Sclater and Salvin

Elainia subpagana SCLATER and SALVIN, Ibis, 1860, p. 36 (Dueñas, Guatemala).

The only specimen was taken by Carriker on January 18, 1940, near Tres Zapotes. I saw no elaienias during my work in 1939, a matter that aroused my interest since the region seems well adapted for them.

MYIOPAGIS VIRIDICATA PLACENS (Sclater)

Elainia placens P. L. SCLATER, Proc. Zool. Soc. London, May 1859, p. 46 (Córdoba, Veracruz).

Carriker secured specimens at Tres Zapotes on January 19 and March 3, 7, 18, and 26, as well as one at El Conejo on February 10. He found them both in heavy forest and in second growth, usually in the smaller trees or shrubs. They were quiet, but not particularly shy. I did not secure this species in 1939.

CAMPTOSTOMA IMBERBE Sclater: Beardless Flycatcher

Camptostoma imberbe P. L. SCLATER, Proc. Zool. Soc. London, Nov. 16, 1857, p. 203 (San Andrés Tuxtla, Veracruz).

On March 19 I saw one working quickly through the open branches of a small tree at camp but did not collect it.

PIPMORPHNA OLEAGINEA ASSIMILIS (Sclater)

Mionectes assimilis P. L. SCLATER, Proc. Zool. Soc. London, May 1859, p. 46 (Córdoba, Veracruz).

On the Sierra de Tuxtla Carriker found this flycatcher fairly common in the undergrowth of the heavy forest, where it rarely ranged

⁴⁸ Proc. U. S. Nat. Mus., vol. 89, 1941, p. 555.

⁴⁹ Publ. Field Mus. Nat. Hist., zool. ser., vol. 13, pt. 5, 1927, p. 310.

more than 20 feet from the ground. He collected three on Cerro de Tuxtla between 1,000 and 2,500 feet elevation on March 29 and April 3, and two on Volcán San Martín between 2,500 and 3,000 feet on April 16 and 21. These were breeding birds, active and noisy with a loud call note. On January 18 Carriker secured one near camp at Tres Zapotes and another came into one of the houses. This was during a period of cold and heavy storm, and it was believed that they were wanderers from the mountains, as neither of us found them again in the lowlands.

The bill in this series of six specimens averages longer than in others but the bird seems to be one that is variable in this respect, several from Teapa in Tabasco being similar.

Family HIRUNDINIDAE

STELGIDOPTERYX RUFICOLLIS FULVIPENNIS (Sclater)

Cotyle fulvipennis F. L. SCLATER, Proc. Zool. Soc. London, 1859, p. 364 (Jalapa, Veracruz).

The only rough-winged swallow collected is an adult female taken on April 3, 1939, at Tres Zapotes, shot as it passed in flight toward the north. Later that same day I saw a band of 30, and on April 10 I noted another little flock. On March 6 and April 15 I recorded swallows of this species at nesting holes in the river bank at Boca San Miguel but did not have opportunity to collect more for specimens. Carriker noted them near Tlacotalpam and at El Conejo.

The one taken has the dark coloration of *fulvipennis* on the dorsal surface and the sides but has only the faintest trace of buff on two or three of the tiny feathers of the throat. It is thus intermediate toward the more northern birds.

Stelgidopteryx ridgwayi, marked by very dark back and sides, I believe to be a distinct species, as it has a decidedly heavier bill than the various forms of the *ruficollis* group.

IRIDOPROCNE BICOLOR (Vieillot): Tree Swallow

Hirundo bicolor VIEILLOT, Histoire naturelle des oiseaux de l'Amérique septentrionale, vol. 1, 1808, p. 61, pl. 31 (New York).

Carriker found a few over the marshes near Tlacotalpam February 7, 1940, and shot a male.

IRIDOPROCNE ALBILINEA (Lawrence)

Petrochelidon albilinea LAWRENCE, Ann. Lyc. Nat. Hist. New York, vol. 8, May 1863, p. 2 (Panamá).

Carriker found a few around the lagoons and near the river at Tlacotalpam, taking a male on February 8, 1940.

Family CORVIDAE

XANTHOURA YNCAS LUXUOSA (Lesson)

Garrulus luxuosus LESSON, Rev. Zool., Apr. 1839, p. 100 (Mexico).

The green jay was noted only in the Sierra de Tuxtla, where Carriker shot a male and saw another bird on May 19 on Cerro de Tuxtla, and secured a pair on April 22 and a male on April 23 on Volcán San Martín, between 2,500 and 3,500 feet elevation. There are specimens in the National Museum taken by Nelson and Goldman at Catemaco on May 5 and at San Andrés Tuxtla on May 10, 1894, and by A. E. Colburn at Paso Nuevo, April 22, 1901.

The seven specimens listed are so definitely intermediate that they are cited under the name *luxuosa* only because there is a very slight preponderance of their characters toward that race. With *luxuosa* they agree in size, including especially the bill and length of wing, and in the restricted amount of white on the forehead. Actually they look very similar to *vicida* with which they agree in brighter, more yellowish coloration of the ventral surface, the under tail coverts especially being yellow with only a slight wash of green. True *vicida*, however, is larger and has more white on the forehead. The southern Veracruz birds thus appear intermediate between the race named *centralis* and its slightly differentiated ally *maya* of van Rossem,⁵⁰ which have clear yellow underparts, with little or no green, that color, where present, being confined to the sides, and true *luxuosa* of farther north. The characters found do not warrant separation of the series from the Tuxtla area under a distinct name.

PSILORHINUS MORIO MORIO (Wagler)

Pica Morio WAGLER, Isis, 1829, p. 751 (Veracruz, Mexico).

Called *pepe* universally like the related species, this great jay, marked by its uniform color without the white tips on the tail, ranged everywhere through groves and woodlands around Tres Zapotes. The two species were found often in company and were about equally common. The three skins preserved were taken on March 28 and April 3, 1939, and February 24, 1940. These have the duller coloration of the southern race. Hellmayr, in the reference cited under *P. m. mexicanus*, groups all these jays under the name *morio*. From Nuevo León and Tamaulipas south into Chiapas and Tabasco these birds present an unbroken series, specimens from the north being pale and those from the south dark. Differences between the extreme north and the south are striking, and the distinctions are definitely joined with geographic distribution. It appears to me proper to

⁵⁰ Bull. Mus. Comp. Zool., vol. 77, Dec. 1934, pp. 395-397.

recognize two forms with the break between them coming somewhere north of the city of Veracruz. Details of range in this area will be decided by more material than now available. The species apparently represents a perfect example to illustrate complete intergradation between two forms.

Possibly there are slight differences in note and habit between the two species of jays found at Tres Zapotes, but if so my period of observation in 1939 was not sufficient to allow me to detect them. It appeared at times that *morio* produced a louder snapping noise than its companion, but of this I was not certain. Both seemed equally inquisitive and vociferous, and both ranged through the same areas. Only in cold, rainy weather were they subdued and still. On such occasions they remained in the thicker trees, coming out to range among the more open growth only between showers and retreating immediately to cover when the downpour was renewed. In the first weeks of my work here the loud and constant calls of the pepes dominated my attention, but in time I became so accustomed to their noise that I often overlooked them. The male shot on March 28 was alone in the forest and scolded me so loudly that it may have had a nest nearby, since it was in breeding condition. The following day I saw one flying about over an open pasture carrying a slender twig in its bill.

The bird taken on March 28 had the breast pouch a little smaller than the individuals of the other species examined and the sac seemed a little thicker walled. This, however, may have been merely individual difference.

The names to be applied to these jays have been discussed recently by van Rossem.⁵¹

PSILORHINUS MEXICANUS MEXICANUS Rüppell

Psilorhinus mexicanus RÜPPELL, Museum Senckenbergianum, vol. 2, pt. 2, 1837, p. 189, pl. 11, fig. 2 (Tamaulipas, Mexico).

I shot a male on March 9 and a female bird on April 3, 1939, the latter being prepared as a skeleton. The relationship of the present species, which has the tail with broad white tips, to *Psilorhinus morio* is most interesting and is a subject that will warrant careful study. At Tres Zapotes the two were in about equal number, and it was common to find them feeding and traveling in company. They were rather social and often ranged in little groups of 3 or 4 to 10, though sometimes they were encountered alone. That we did not prepare a series of the present species was due solely to preoccupation with other work, as there was no difficulty whatever in shooting them, so

⁵¹ Bull. Mus. Comp. Zool., vol. 77, Dec. 1934, pp. 414-416.

that Hellmayr's comment on this species⁵² that there are only 10 or 12 recorded specimens is no criterion of its abundance. I saw dozens of them in life. Further, it appears to me from the observations of my one season that two species are involved, a conclusion that is substantiated by the fact that both *morio* and *mexicanus* show variation in color in different parts of the range. Moreover, the color variations are not correlated in the two types, since according to present treatment *P. m. mexicanus* is found through the area inhabited by the two accepted subspecies of *Psilorhinus morio*. Also, the type with plain tail, *morio*, does not occur south of Chiapas, while two races of *mexicanus* extend through the area from Guatemala to the Almirante region in Panamá.

Under the name of *pepe* these jays are known to every country dweller, as they are vociferous and omnipresent. At our camp the two jays always ushered in the dawn, since at the faintest hint of light in the east, even as early as a few minutes after 4 a. m., scattered individuals came flying out over the pastures calling, while it was still far too dark to see them in the sky. In fact, their querulous, complaining notes were often mingled with the last calls of the goatsuckers (*Nyctidromus*), whose songs had continued throughout the night, long before any of the other daytime birds were astir.

The pepes were the subject of universal complaint among the farmers because of their destruction of corn. When the ears had formed in the fields children or, if there were no children in the family, older people went out at dawn into the milpas where, with shouting and stones cast by hand or from slings, they endeavored to keep the jays, the grackles, and the smaller blackbirds on the move. As I traveled along the trails, jays were often in evidence, calling frequently when they saw me and often coming down within 30 or 40 feet to scold me with jerking tails and wings and much peering and posturing. Occasionally they were shy, but this was unusual, as they were molested little by shooting because of the cost of ammunition.

Often they flew out with a curious hesitant but steady flapping of wings, calling loudly and at the same time producing a curious snapping sound. Sometimes this latter noise was heard when the birds were not calling, and almost on my first day afield here I saw when birds flew overhead a yellow spot appear on the breast, though when at rest this was not visible. In handling my first specimen, I found this spot of color was really a pouch of somewhat thickened skin, located over the junction of the two branches of the furculum. In a fresh-killed bird I could sometimes inflate and deflate this pouch by compressing and releasing the posterior part of the body so that air was driven into it and then withdrawn. The fully inflated sac was some-

⁵² Publ. Field Mus. Nat. Hist., zool. ser., vol. 13, pt. 7, 1934, p. 15.

what elongate and was about the size of the terminal joint of my little finger. On dissection, I found that the pouch was connected with the interclavicular air-sac, and by that means with the lungs. The snapping sound described apparently came through its sudden distension with air. The structure was new to me and has been noted by few naturalists.

On inquiry I learned that Dr. George M. Sutton also had observed this curious structure during his work in eastern Mexico, and his notes on it, which he showed me at the time, he recently has elaborated with preserved material in collaboration with Perry W. Gilbert.⁵³ The earliest published note on the sac that I have found is by Cabot,⁵⁴ who saw it in the subspecies found in Yucatán, *Psilorhinus mexicanus vociferus*, though he was wrong in his description of its anatomy. He writes "they have a most peculiar formation in the trachea, being a membranous bag, coming off between the rings, and half way down, and intimately connected with the skin of the neck." It was first described accurately by Crandall,⁵⁵ who recorded the sac in *P. m. cyanogenys* in Costa Rica and also observed it in a captive specimen of *P. morio* in the collections of the New York Zoological Society. This bird produced the popping sound regularly. On dissection of this bird after its death Crandall recorded that the sac was a diverticulum from the interclavicular air-sac.

Family TROGLODYTIDAE

HELEODYTES ZONATUS RESTRICTUS Nelson

Heleodytes zonatus restrictus NELSON, Auk, 1901, p. 49 (Frontera, Tabasco).

The series obtained is as follows: Tres Zapotes, March 7 and 15, 1939, February 27, March 3 and 27, and April 5, 1940; Tapacoyan, May 11; below 1,000 feet elevation on Cerro de Tuxtla, May 7. They were fairly common, usually in little groups, but except when calling they were often unnoted, as they kept in heavy cover of dense leaves and tangles of vines. They ranged from the tops of bushes into the taller trees. Rarely they were observed passing with tilting flight between tracts of brush. The croaking, creaking calls are strange and curious, and they are known locally as *carrasquita* from their notes.

The series obtained appears to be intermediate between true *restrictus* of Tabasco and the style of this wren found from Veracruz City northward and westward. It differs from *restrictus* in the smaller amount of spotting and barring on flanks and abdomen but is definitely more heavily marked than birds from farther north. The species is one that is in need of revision, particularly since no type

⁵³ Condor, 1942, pp. 160-165, figs. 58-60.

⁵⁴ Cabot, S., Journ. Boston Soc. Nat. Hist., vol. 4, 1844, p. 465.

⁵⁵ Zoologica, vol. 1, No. 18, Sept. 1914, p. 337.

locality has been designated for the typical form so far as I am aware, though several races have been segregated. Assignment of the specimens from Tres Zapotes and vicinity is tentative, as it must be noted that they seem to resemble the form *impudens* described by Bangs and Peters from Oaxaca.

PHEUGOPEDIUS MACULIPECTUS MACULIPECTUS (Lafresnaye)

Thriothorus maculipectus LAFRESNAYE, Rev. Zool., vol. 8, 1845, p. 337 (Veracruz, Mexico⁶⁵).

A good series comes from Tres Zapotes, taken between January 22 and April 11, with one bird from the base of Cerro de Tuxtla, May 7, and three from El Conejo, February 10 and 12 and May 15. There is a further specimen in the National Museum taken at Tlacotalpam on May 28, 1894, by Nelson and Goldman. Carriker encountered it to about 1,000 feet elevation in the Sierra de Tuxtla. This was a common wren throughout the region, ranging indifferently in undergrowth in heavy forest, in second growth, and in clumps of brush scattered through old fields and pastures. It is found usually near the ground. The clear, ringing song, to be represented by the syllables *cho hó cho hó*, repeated several times, was heard daily at camp and during trips into the field, one of the most pleasing bird sounds of the region. As early as March 24 I saw one displaying before another with bill pointing skyward, spread tail and shaking wings. Carriker shot a grown juvenile individual at El Conejo on May 15. This bird has only a very few faint spots on the foreneck. Two adults from this same point have the black spotting reduced in size and in extent over the lower breast, and the dorsal surface slightly paler than other skins in the present series. It is possible that there is a coastal form in this area.

TROGLODYTES AËDON AËDON Vieillot: Eastern House Wren

Troglodytes aëdon VIEILLOT, Histoire naturelle des oiseaux de l'Amérique septentrionale, vol. 2, 1807 (1808 or 1809), p. 52, pl. 107 (New York, N. Y.⁶⁷).

Carriker shot a male of this race of the house wren at Tres Zapotes on January 20, 1940, this being the most southern point at which it has as yet been found.

TROGLODYTES AËDON PARKMANII Audubon: Western House Wren

Troglodytes parkmanii AUDUBON, Ornithological biography, vol. 5, 1839, p. 310 (near Fort Vancouver, Wash.).

At Tres Zapotes I shot a female on March 8 and a male on April 4. Other house wrens were seen on March 12 and 30, the latter being in song. The race of these last two is uncertain, as the birds were not

⁶⁵ Designated by L. Griscom, Proc. New England Zool. Club, vol. 12, Apr. 3, 1930, p. 5.

⁶⁷ Designated by H. C. Oberholser, Ohio Journ. Sci., vol. 34, Mar. 1934, p. 87.

obtained. The birds were found in weed patches in old fields. The western house wren has been recorded previously only south to Orizaba, so that the two secured mark a southern extension of the winter range.

HENICORHINA LEUCOSTICTA PROSTHELEUCA (Sclater)

Scytalopus prosthelencus P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 290 (Córdoba, Veracruz).

The following are dates on which specimens were taken: Tres Zapotes, March 10, 16, 24, 25, April 6, 1939, January 22, February 24, 1940; Cerro de Tuxtla, March 11, 19, April 3, 1940. They were found in the original stands of heavy forest where shadows were dense and often where it was damp and wet. Carriker recorded them to the summit of Cerro de Tuxtla and to 4,000 feet elevation on Volcán San Martín.

NANNORCHILUS LEUCOGASTER LEUCOGASTER (Gould)

Troglodytes leucogastra GOULD, Proc. Zool. Soc. London, 1836 (Feb. 20, 1837), p. 89 (Tamaulipas).

Near Tres Zapotes this was the most common wren, so that we secured a good series between January 22 and April 5. The birds ranged in thickets and second growth, usually near the ground, but occasionally they ascended into the lower tree tops where there was a protective screen of creepers. They were found frequently in pairs, and ordinarily were so tame and curious that they could be called out into sight without much trouble. The clear, sweet song, of surprising volume for so small a bird, was heard daily, and came regularly from thickets about our camp. Their chattering calls greeted me on every journey afield.

Family MIMIDAE

DUMETELLA CAROLINENSIS (Linnaeus): Catbird

Muscicapa carolinensis LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 328 (Virginia).

This is one of the common winter residents among the North American migrants. Carriker recorded them as common on his arrival at Tres Zapotes in January and found them through the hills up to the limit of open country at El Tular on Volcán San Martín. They range along the lines of trees and thickets bordering the milpas and penetrate thickets elsewhere where the light enters. In 1939 I saw several on April 13 on my last day afield.

MIMUS POLYGLOTTOS LEUCOPTERUS (Vigors): Western Mockingbird

Orpheus leucopterus VIGORS, The zoology of Captain Beechey's voyage, 1839, p. 17 (Monterey, Calif.).

In the sand dune area near the coast at El Conejo, Carriker found mockingbirds common, but we did not note them elsewhere in the area that we covered, except that I saw one from the train near La Piedra between Alvarado and Veracruz on April 16, also in the coastal area but farther north. Carriker secured a series of ten birds on February 10 and 12 and May 15. On the last date he observed that they were nesting.

The specimens secured are of more than ordinary interest. Currently it has been held that *Mimus polyglottos* as a species, when compared with *M. gilvus*, is marked by white primary coverts, extensive white on the basal portions of the inner primaries, and by having the outer rectrix white except occasionally when there is a blackish margin on the outer web. In *Mimus gilvus* as a species the primary coverts have been said to be black, the bases of the primaries without white, and the outer rectrix with the base extensively black. Actually the subspecies *Mimus gilvus gracilis* often has considerable white on the inner webs of the primaries at the base. Also, in *Mimus polyglottos polyglottos* an occasional individual has extensive black markings across the center of the outer rectrix. We have two female birds from Hornbeak, Tenn. (No. 351105), and Jacksonville, Fla. (No. 54867), that show this character. A female of *M. p. leucopterus* from Fort Verde, Ariz. (No. 235964), shows the same marking to a less extent. It appears then that the color of the primary coverts is the most definite character separating the two species though here there is occasional black tipping in *polyglottos*. It may be noted that *gilvus* is always grayer and that its bill is somewhat more slender. The two are close but sufficiently different to warrant maintenance as distinct specific groups.

The two species *polyglottos* and *gilvus* meet across the Isthmus of Tehuantepec, where they merit careful study. We have in the National Museum from the city of Tehuantepec a skin of *M. g. gracilis* taken on October 29, 1869, and one of *M. p. leucopterus* on February 12, 1904. Similarly, from Puerto México (Coatzacoalcas), Veracruz, there is a series of *M. g. gracilis* taken on April 13 to 15, 1896, and January 27, 1904, and one *leucopterus* dated January 28, 1904.

At the point of junction through this region the two species apparently hybridize at times. From El Conejo we have one male (No. 360063) with the black tail markings of *gilvus* and the white primary coverts of *polyglottos*, and another of the same sex (No. 360059) that displays a slight tendency in this direction, as the inner web of the

outer rectrix shows some black and the tips of the white primary coverts are definitely tipped with black. Among the specimens from Puerto México (Coatzacoalcos) there is one female (No. 142601) with the tail of *gracilis* and the primary coverts of *leucopterus*, and a second female (No. 142555) with the center of the white outer rectrix mottled with dusky and the primary coverts two-thirds black and one-third white. Another example of this is found in specimens in the National Museum from San Mateo del Mar, Oaxaca, where the three taken on May 16, 1905, are *M. g. gracilis*, and a fourth, a male (No. 142603) shot May 15, 1905, has the primary coverts white except for dark tips, in this showing a character of *polyglottos* though otherwise resembling the other three.

The skins just described all come from the area in which the two species meet; the peculiar specimens offer characters in such combination that I consider them hybrids rather than intergrades, so that *polyglottos* and *gilvus* remain as distinct entities.

Family TURDIDAE

TURDUS MIGRATORIUS MIGRATORIUS Linnaeus: Eastern Robin

Turdus migratorius LINNAEUS, *Systema naturae*, ed. 12, vol. 1, 1766, p. 292 (South Carolina, based on a winter migrant).

On February 28, 1940, Carriker shot a male in a clump of trees in a large pasture near camp, this being the only bird of the species that we found. It is a typical example of *migratorius*, a new record for the country. Darker color above and below, white tail spots, and larger bill distinguish it from *T. m. phillipsi* Bangs.

TURDUS ASSIMILIS LEUCAUCHEN Sclater

Turdus leucauchen P. L. SCLATER, *Proc. Zool. Soc. London*, 1858 (1859), p. 447 (Guatemala).

Carriker found these thrushes on the higher, forested slopes of Sierra de Tuxtla, taking specimens on Cerro de Tuxtla on April 3 and 9 and May 10 and 11 and on Volcán San Martín on April 22 and 23. On Tuxtla they were noted mainly above 1,800 feet, while on San Martín they were found between El Tular and 4,000 feet elevation.

The seven specimens include five males and two females, the latter being distinctly browner above than the other sex. The birds agree fairly well with a series of old trade skins from Guatemala, allowing for discoloration due to age, and are distinctly different from typical *assimilis* of a little farther north in Veracruz. It is of interest to note that this is another species from the Tuxtla range that shows affinity with the mountain areas of Chiapas and other regions to the south, rather than with Orizaba and the other mountains of west-central Veracruz.

TURDUS GRAYI GRAYI Bonaparte

Turdus Grayi BONAPARTE, Proc. Zool. Soc. London, 1837 (June 14, 1838), p. 118 (Alta Vera Paz, Guatemala).

Near Tres Zapotes we secured specimens on March 27 and 30, 1939, and March 4 and 14 and May 14, 1940. These birds had the usual habit of tropical thrushes of living in dense undergrowth or in the borders of heavier forests, coming up into the tree tops to sing. The call is a high-pitched *pup pup pup*, an imitation in higher tone of the note of our northern robins, and the somewhat indefinite song is also robinlike but also suggested to me the notes of an oriole. The natives call them *primavera*, as they say that they come in spring. Carriker secured two in the outskirts of Tlacotalpam on February 15 and 16, but he saw no others until early in March. Possibly they may come into the Tres Zapotes region from elsewhere to breed, but it seems more probable that they remain under cover and are overlooked. In April I heard them singing daily near our camp.

One male taken on March 30 at Tres Zapotes is lighter, less brownish, than the others, showing some approach to the coastal race *tamaulipensis*. It is, however, darker on the dorsum and the flanks than the average of that race, and is placed with *grayi*.

MYADESTES UNICOLOR UNICOLOR Sclater

Myiadeses unicolor P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 299 (Córdoba, Veracruz).

Above 2,000 feet on Cerro de Tuxtla Carriker found this to be a common bird. On March 11 he took two specimens, with others on March 13 and 29 and April 3. At his first visit they were in full song, but he thought that actual nesting did not come until April. On Volcán San Martín he secured two on April 20, and considered this the most common bird at the higher altitudes. He recorded many on the rim of the crater where he heard at its best the beautiful song. The species is known as *jilguero* on Tuxtla and as *clarín* on San Martín. There is a female in the National Museum taken by Nelson and Goldman on May 12, 1894, marked "Volcano Tuxtla." The label states that this bird was found with a nest containing two eggs. The latter apparently did not reach the Museum as they are not to be found in the collection now.

HYLOCICHLA MUSTELINA (Gmelin): Wood Thrush

Turdus mustelinus GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 817 (New York).

On March 23, 1939, I heard the familiar call of the wood thrush in swampy woodland near the Laguna del Tular and called two into

the open where I could see them. One of these I shot but by mischance destroyed it.

In 1940 Carriker secured one from a boy at Tres Zapotes on January 26 and shot another in heavy forest on March 3. Two more were collected on Cerro de Tuxtla on March 11 and 29 between 1,000 and 2,500 feet elevation.

HYLOCICHLA USTULATA USTULATA (Nuttall): Russet-backed Thrush

Turdus cestulatus [= *ustulatus*] NUTTALL, A manual of the ornithology of the United States and Canada, ed. 2, vol. 1, 1840, pp. 400, 830, and vi (Fort Vancouver, Wash.)

It is a matter of special interest to examine a female taken by Carriker at Tres Zapotes on January 29, 1940.

HYLOCICHLA USTULATA ALMAE Oberholser: Western Olive-backed Thrush

Hylocichla ustulata almae OBERHOLSER, Auk, Oct. 1898, p. 304 (east Humboldt Mountains, Nev.).

Carriker shot a male on April 16, 1940, between 2,500 and 3,500 feet elevation on Volcán San Martín.

CATHARUS MEXICANUS MEXICANUS (Bonaparte)

Malacocychla mexicana BONAPARTE, Compt. Rend. Acad. Sci. Paris, vol. 43, 1856, p. 998 (Jalapa, Veracruz).

Carriker found these birds on the Sierra de Tuxtla, where he secured his first specimen on March 29, 1940, at about 2,000 feet elevation on Cerro de Tuxtla. This individual flushed from the ground in thick underbrush and alighted nearby on the ground. On Volcán San Martín he secured a pair on April 16 between 2,500 and 3,500 feet elevation. They seemed more common here but, as usual, were shy and difficult to secure. They were building nests at this time.

Family SYLVIIDAE

POLIOPTILA CAERULEA CAERULEA (Linnaeus): Blue-gray Gnatcatcher

Motacilla caerulea LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 337 (Philadelphia, Pa.).

As migrants from the north, we secured specimens of the blue-gray gnatcatcher at Tres Zapotes on March 8, 1939, and January 18 and March 4, 1940. Carriker shot one at Tlacotalpam on February 7, and another at 1,800 feet elevation on Cerro de Tuxtla on March 19. The specimens have the following measurements: Two males, wing 51, 51.4, tail 46.9, 49 mm.; three females, wing 50, 50.2, 51.4, tail 46.2, 48.4, 49.5 mm.

POLIOPTILA CAERULEA DEPPEI van Rossem

Polioptila caerulea deppei VAN ROSSEM, Bull. Mus. Comp. Zool., vol. 77, 1934, p. 402 (Río Lagartos, Yucatán).

Four specimens of this resident race were taken at Tres Zapotes on January 20 and 26, March 26, and April 2, 1940. Measurements are as follows: One male, wing 48.5, tail 41.1 mm.; three females, wing 47.9, 48.2, 48.7, tail 46.2, 46.5, 47.2 mm. The difference in size that marks this race actually is little but seems diagnostic. It appears to me also that the gray of the upper surface is slightly lighter than in the average of the northern bird. Carriker noted that the male, taken on April 2, was in breeding condition.

Van Rossem (loc. cit.) has found that the type of Bonaparte's *Culicivora mexicana* described in the Conspectus Generum Avium, vol. 1, 1850, page 316, from Oaxaca is a female of *Polioptila c. caerulea* and has given the resident race of gnatcatcher of the lowlands of southern Mexico the name *deppei*.

RAMPHOCAENUS RUFIVENTRIS RUFIVENTRIS (Bonaparte)

Scelopacinus rufiventris BONAPARTE, Proc. Zool. Soc. London, 1837 (June 14, 1838), p. 119 (San José de Guatemala, Guatemala⁶³).

This is a resident species around Tres Zapotes, where we secured specimens on March 10, 11, and 15 and April 1, 1939, and January 26, 29, February 27, 28, and April 11, 1940. The birds were found in dense thickets and masses of vines usually at the border of forest where they remained in dense cover, so that it was difficult to see them except when they were close at hand. Marked by the long, slender bill, they hopped quickly among the twigs, jerking the narrow tail up and down and at times cocking it over the back like a wren. The song, heard frequently in sunny thickets, is a rapid, prolonged trill that rises in tone at the end.

The syrinx is oscine and in the pterylosis the dorsal tract is definitely interrupted below the median rhomboid.

Family CYCLARHIDAE

CYCLARHIS GUJANENSIS FLAVIVENTRIS Lafresnaye

Cyclaris flaviventris LAFRESNAYE, Rev. Zool., vol. 5, 1842, p. 133 (Santa Cruz=Veracruz, Mexico).

The small series was taken near Tres Zapotes on March 18 and 23, 1939, and March 4, 6, and 11 and May 3 and 6, 1940. Carriker did not record these birds until they began to sing in March. In my own observations, attention was drawn to them at the same period by

⁶³ Designated by van Tyne and Trautman, Occ. Papers Mus. Zool. Univ. Michigan, No. 439, July 1, 1941, p. 10.

their singing, which I recorded at intervals until my departure on April 15. They ranged in leafy cover, sometimes in tree tops projecting above the surrounding growth, and sometimes along thicket lined trails, or in more open trees near the village. They moved along rather quickly and kept under shelter.

Family VIREONIDAE

VIREO GRISEUS GRISEUS (Boddaert): White-eyed Vireo

Tanagra grisea BODDAERT, Table des planches enluminées, 1783, p. 45 (Louisiana).

This familiar bird is a common winter resident in the thickets bordering the milpas about Tres Zapotes. In March I found them singing regularly and for a time it almost seemed that they were on their breeding grounds, but by the end of the month they had begun to decrease in abundance. On April 11, 1939, I noted that they were far less conspicuous, so that by then the majority apparently had moved north. The song was puzzling as it differed somewhat from that given in their breeding grounds, being not so emphatic or loud. Carriker found them abundant from late January to March, when they disappeared. Our specimens are all of the northern form.

VIREO FLAVOVIRIDIS FLAVOVIRIDIS (Cassin)

Vireosylvia flavoviridis CASSIN, Proc. Acad. Nat. Sci. Philadelphia, vol. 5, 1851, p. 152 (San Juan de Nicaragua, Nicaragua).

This bird in 1939 apparently arrived late in its return from its winter home to the Tres Zapotes region, as I found none to the date of my departure on April 15. The following year Carriker secured the first one April 3 on Cerro de Tuxtla, followed by another from Hueyapa April 8. They were common on Tuxtla, where additional specimens were taken April 9 and May 4, and were found in smaller numbers in the lowlands. Carriker shot one at El Conejo on May 15 and one at Tlacotalpam on May 17.

Vireo flavoviridis differs from *Vireo olivaceus* in the distinctly yellowish-green sides and under tail-coverts, so that the two may be distinguished at a glance. The yellowish-green color is as evident in very young *flavoviridis* in full juvenal plumage as it is in adults. In *Vireo olivaceus*, adult and juvenal, there is never more than a trace of this brighter color, and where present this is duller, more greenish, perceptible only on close scrutiny. I have examined considerable series of both birds without finding indication of intergradation, so that I am forced to conclude that the two are specifically distinct in spite of current treatment of them where *flavoviridis* has been listed as a geographic race of *olivaceus*.

Vireo flavoviridis hypoleucus van Rossem and Hachisuka⁵⁰ is a race of *flavoviridis* marked by duller green above, and slightly paler, less greenish sides, and is in no sense an intergrade toward *olivaceus*. Nor is there any indication of intergradation in a series of *flavoviridis* that I have seen from Tamaulipás.

Van Rossem⁶⁰ has suggested that the type locality of *flavoviridis*, named by Cassin from specimens from Panamá and from San Juan de Nicaragua should be placed in "western Nicaragua." It seems better, however, to accept the more definite designation of Zimmer⁶¹ of San Juan de Nicaragua, since that is one of the places from which Cassin had material. Examination of the good series in the National Museum upholds Zimmer's decision that the supposed southern race *insularis* named by Bangs is inseparable from *flavoviridis*.

VIREO FLAVIFRONS Vieillot: Yellow-throated Vireo

Vireo flavifrons VIEILLOT, Histoire naturelle des oiseaux de l'Amérique septentrionale, vol. 1, 1807 (1808), p. 85, pl. 54 (eastern United States).

Carriker collected a male at Tres Zapotes on February 24, 1940.

HYLOPHILUS OCHRACEICEPS OCHRACEICEPS Sclater

Hylophilus ochraceiceps P. L. SCLATER, Proc. Zool. Soc. London, 1859 (Feb. 1860), p. 375 (Playa Vicente, Oaxaca).

On April 12, 1939, I found a pair working quickly through the denser undergrowth in heavy forest at Arroyo Corredor. Carriker secured two here on April 1 and 6, 1940. In the Sierra de Tuxtla he found them more common, taking specimens on Cerro de Tuxtla on March 23, April 9, and May 7 and 11 and on Volcán San Martín on April 16 and 23. They ranged to 3,000 feet elevation.

HYLOPHILUS DECURTATUS DECURTATUS (Bonaparte)

Sylvicola decurtata BONAPARTE, Proc. Zool. Soc. London, 1837 (June 14, 1838), p. 118 (Guatemala).

This was a common species in forested areas. Our series was taken near Tres Zapotes on April 4, 6, 10, and 12, 1939, and February 23 and 28, March 26 and April 6, 1940; on Cerro de Tuxtla on March 19 and May 9; and at Tapacoyan on May 5, 1940. In the mountains Carriker found them to about 1,500 feet elevation.

I observed them especially in the great forest at Arroyo Corredor and in the swampy woods below the Cerro Chico Zapote. Their calls were low and rather harsh, given with slight emphasis, while the song

⁵⁰ *Vireo olivaceus hypoleucus* van Rossem and Hachisuka, Proc. Biol. Soc. Washington, vol. 50, Sept. 30, 1937, p. 159 (San Francisco Canyon, eastern boundary of Sonora, Mexico, lat. 27° N., 1,200 feet elevation).

⁶⁰ *Ibid.*, p. 160.

⁶¹ Amer. Mus. Nov., No. 1127, June 26, 1941, p. 2.

may be represented by the syllables *re seck re seck re seck*, reminiscent of that of *Hylophilus aurantiifrons saturata* as I have heard it in northern Venezuela, but lower and less clear in tone. They feed in active fashion through the small leafy twigs of the middle and upper branches, suggesting small warblers in their movements.

The geographic treatment of this bird has varied from its division into three subspecies to its listing as a species without races. The series in the U. S. National Museum indicates clearly that it should be divided. The following is my understanding of the races to be recognized:

Hylophilus decurtatus decurtatus (Bonaparte):

Sylvicola decurtata BONAPARTE, Proc. Zool. Soc. London, 1837 (June 14, 1838) p. 118 (Guatemala).

Duller green above and on the sides and under tail-coverts; breast and foreneck more grayish.

Córdoba, Veracruz, to Costa Rica (except lowlands of northern Guanacaste, and Talamanca).

Hylophilus decurtatus pallidus (Dickey and van Rossem):

Pachysylvia decurtata pallida DICKEY and VAN ROSSEM, Proc. Biol. Soc. Washington, vol. 40, Jan. 8, 1927, p. 4 (Puerto del Triunfo, Department Usulután, El Salvador).

Lighter throughout; crown paler gray, back lighter, more yellowish green; breast and foreneck whiter; sides and under tail-coverts lighter, more yellowish green.

Pacific slope of southern Central America from western El Salvador to northern Guanacaste (Liberia), Costa Rica.

Hylophilus decurtatus pusillus Lawrence:

Hylophilus pusillus LAWRENCE, Ann. Lyc. Nat. Hist. New York, vol. 7, 1862, p. 323 (Atlantic side, Isthmus of Panamá).

Crown definitely darker; duller green above and on sides, averaging duller than *decurtatus*.

Talamanca, Costa Rica, and Chiriquí through western Panamá to the Canal Zone.

Hylophilus minor and its subspecies *darienensis* have the head green, concolorous with the back, instead of gray as in *decurtatus* in all its races, and are therefore to be held specifically distinct.

Family COEREBIDAE

CYANERPES CYANEUS CARNEIPES (Sclater)

Coccyba carneipes P. L. SCLATER, Proc. Zool. Soc. London, 1859 (Feb. 1860), p. 376 (Playa Vicente, Oaxaca).

On March 29, 1939, near Tres Zapotes at the border of the low hills back of Laguna Larga, I secured the male of a pair of these honeycreepers as the two birds rested in the breeze in the top of an open-limbed tree that projected above the heavy forest. On April 6 I shot a female from a tall tree in heavy, swampy woodland below the Cerro Chico Zapote. It was interesting to note the elongate, somewhat flattened, and rather heavy body in these birds as compared with *Coereba*, and also the large stomach and the wide diameter of the intestines. It seems not impossible that these two genera should be placed in separate subfamilies. The male mentioned had eaten three drupes as large as medium-sized peas, which were held in the throat. Carriker found these birds fairly abundant over the lower slopes of Cerro de Tuxtla about old clearings and in second growth. He collected specimens on March 19 and May 5, 8, 9, 10, and 11.

Mrs. Hobart M. Smith, when at Finca Juárez in Chiapas, Mexico, during investigations there by Dr. Smith under the Walter Rathbone Bacon Traveling Scholarship, collected for the U. S. National Museum 2 males and 3 females of the blue honey-creeper at the type locality of *Cyanerpes cyaneus striatipectus* Brodkorb.⁶² Three females appear to have slightly heavier bills than most *carneipes* seen but are equaled in this by two of those from Tres Zapotes. The color is matched by occasional birds from elsewhere in the range. Two males are not to be distinguished in bill size or color from a considerable series of *carneipes* from Mexico to Panamá. After a prolonged examination of a large series of specimens of *Cyanerpes cyaneus* throughout its entire range, I incline to believe that more material is required to prove that *striatipectus* is definitely distinct in view of the individual variation in this group.

COEREBA FLAVEOLA MEXICANA (Sclater)

Certhiola mexicana P. L. SCLATER, Proc. Zool. Soc. London, 1856 (Jan. 26, 1857), p. 286 (southern Mexico).

This bird was rather rare. On March 15, 1939, I found two at a flowering tree near camp and shot a female. I recorded others on March 21 and 29. Carriker in 1940 secured specimens at Tres Zapotes on January 29 and February 27, at between 800 and 1,200 feet elevation on Cerro de Tuxtla on May 4, and at about 3,500 feet on Volcán San Martín on April 16.

The specimen from which Sclater drew his description was without locality but was part of a considerable collection brought by Auguste Sallé from a journey in southern Mexico. The birds were obtained principally near Córdoba in Veracruz, with some from else-

⁶² *Cyanerpes cyaneus striatipectus* Brodkorb, Occ. Papers Mus. Zool. Univ. Michigan, No. 369, Apr. 11, 1938, p. 5 (Finca Juárez, Chiapas, altitude 900 meters).

where in the southern part of that province and a few from adjacent Puebla. Should need arise at any time for a more definite type locality for this race of the honey-creeper, it appears quite certain that the type came from near Córdoba.

Family COMPSOTHTYPIIDAE

MNIOTILTA VARIA (Linnaeus): Black and White Warbler

Motacilla varia LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 333 (Hispaniola).

In 1939 I noted single birds near Tres Zapotes regularly from March 15 to April 11, taking specimens on March 20 and April 4 and 5. In 1940 Carriker shot one at Tlacotalpam on February 9 and one at El Conejo on May 15.

HELMITHEROS VERMIVORUS (Gmelin): Worm-eating Warbler

Motacilla vermivora GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 951 (Philadelphia, Pa.).

Near Tres Zapotes in 1939 I saw one on March 15 and shot one on March 28. The following year Carriker collected specimens on February 23 and 28 and March 7.

VERMIVORUS PINUS (Linnaeus): Blue-winged Warbler

Certhia Pinus LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 187 (Philadelphia, Pa.).

A beautiful male was taken near camp at Tres Zapotes, March 11, 1939.

VERMIVORA PEREGRINA (Wilson): Tennessee Warbler

Sylvia peregrina WILSON, American ornithology, vol. 3, 1811, p. 83, pl. 25, fig. 2 (banks of the Cumberland River in Tennessee).

Carriker shot a female on April 20, 1940, at 5,400 feet elevation on Volcán San Martín.

VERMIVORA CELATA CELATA (Say): Orange-crowned Warbler

Sylvia celatus SAY, in Long, Expedition to the Rocky Mountains, vol. 1, 1823, p. 169 (Omaha, Nebr.).

The two obtained were secured at Tlacotalpam on February 9 and Tres Zapotes March 26, 1940.

COMPSOTHTYPIA AMERICANA PUSILLA (Wilson): Northern Parula Warbler

Sylvia pusilla WILSON, American ornithology, vol. 4, 1811, p. 17, pl. 28, fig. 3 (Philadelphia, Pa.).

Though not present in large numbers, as a winter resident and migrant this warbler is not rare around Tres Zapotes. It is found in scattered groves as well as in the forest. In 1939 I recorded it until

March 22, taking specimens on March 7, 13, 17, and 18. Carriker collected it in 1940 on January 20, February 22, and March 27.

The status of the parula warbler as regards its division into subspecies appears to me unsatisfactory at present. The treatment here is in accord with that of the fourth edition of the A. O. U. Check-list.

COMPSOTHLYPIS PITIAYUMI INORNATA (Baird)

Parula inornata BAIRD, Review of American birds, 1864, p. 171 (Choctum, Guatemala).

Though we did not encounter this warbler because of its rarity in the general area, it is of interest to record a male received from A. E. Colburn, taken at Buena Vista, Veracruz, May 18, 1901. This bird while slightly intermediate toward *nigrilora* is decidedly nearer to *inornata*.

DENDROICA PETECHIA RUBIGINOSA (Pallas): Alaska Yellow Warbler

Motacilla rubiginosa PALLAS, Zoographia Rosso-Asiatica, vol. 1, 1811, p. 496 (Kodiak Island, Alaska).

Among the yellow warblers there are three that are identified as the present form distinguished from *D. p. amnicola* by duller, more greenish dorsal color, and in the male by less yellow on the forehead.

On April 6, 1939, I shot an adult female at Tres Zapotes, this bird having nearly completed the molt. Carriker secured a male at Hueyapa in the Tres Zapotes area April 2, 1940, with the molt nearly at an end. He also took a female at El Conejo on May 15, this being an outstanding example of the late date to which some migrants from the far northern parts of North America may linger within the Tropics.

J. W. Aldrich⁶³ has demonstrated recently that the yellow warblers and golden warblers are conspecific, so that all are to be grouped under the name *petechia*.

DENDROICA PETECHIA AMNICOLA Batchelder: Newfoundland Yellow Warbler

Dendroica aestiva amnicola BATCHELDER, Proc. New England Zool. Club., vol. 6, Feb. 6, 1918, p. 82 (Curslet, Newfoundland).

The present form, though not included in the fourth edition of the A. O. U. Check-list (1931), in my opinion is to be recognized. As has been indicated by Oberholser,⁶⁴ it is separable from *D. p. rubiginosa* by the more yellowish dorsal surface, with the forehead yellow in the male. The female has the upper surface lighter. It differs from typical *aestiva* by being darker above, with the yellow on the

⁶³ Auk, 1942, pp. 447-449.

⁶⁴ Louisiana Dept. Conservation Bull. 28, 1938, pp. 530-531.

forehead of the male duller and the edgings on the remiges duller. As pointed out by Oberholser, it is not restricted to Newfoundland but extends across Canada to central Alaska. No doubt it is this bird, which must be numerically far more abundant than the Alaska yellow warbler, that has been the basis of part of the records of *D. p. rubiginosa* at various localities in the eastern part of the United States.

Specimens identified as *annicola* were secured as follows: Tres Zapotes, March 20, 21, 30, and 31 and April 13, 1939, January 17 and March 15, 1940; Tlacotalpam, February 19, 1940. Several of these are in various stages of molt between the first fall plumage and the nuptial dress. Identification of some of these immature individuals is a difficult problem.

Further collecting should reveal others of the eight recognized forms of the *aestiva* group in this region.

DENDROICA MAGNOLIA (Wilson): Magnolia Warbler

Sylvia magnolia WILSON, American ornithology, vol. 3, 1811, p. 63, pl. 23, fig. 2 (Fort Adams, Miss.).

This is the most common of the migrant warblers that come to the Tres Zapotes region. Carriker recorded it in January on his arrival, and in 1939 I found it in numbers until April 13. Carriker secured specimens at Tlacotalpam on February 5 and April 8. Immature males were molting into adult body dress in March. The species was found everywhere in groves and woodland.

DENDROICA CORONATA HOOVERI McGregor: Alaskan Myrtle Warbler

Dendroica coronata hooveri MCGREGOR, Bull. Cooper Orn. Club., vol. 1, 1899, p. 32 (Palo Alto, Calif.).

On March 22, 1939, I shot a myrtle warbler near camp at Tres Zapotes, the only one that I saw in this vicinity. Carriker collected two at Tlacotalpam on February 5 and 8, 1940, reporting that the birds were common in trees and bushes in the marshy lands. On April 20 he secured a female on the summit of Volcán San Martín at 5,400 feet elevation.

These four specimens all belong to the Alaskan form, which is distinctly grayer brown above than the eastern subspecies in the plumage stages of fall, winter, and early spring.

DENDROICA VIRENS VIRENS (Gmelin): Black-throated Green Warbler

Motacilla virens GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 985 (Philadelphia, Pa.).

Carriker collected males near Tres Zapotes on March 25 and 27 and on the summit of Volcán San Martín on April 20. The latter was in

company with other migrant warblers. All three are examples of the typical race, marked from *D. v. waynei* by larger bill and brighter dorsal color.

DENDROICA DOMINICA ALBILORA Ridgway: Sycamore Warbler

Dendroica dominica var. *albiflora* RIDGWAY, Amer. Nat., vol. 1, Oct. 1873, p. 606 (Belize, British Honduras).

In spring migration we secured this bird near Tres Zapotes on March 20, 1939, and March 16 and 25, 1940.

SEIURUS AUROCAPILLUS AUROCAPILLUS (Linnaeus): Ovenbird

Motacilla aurocapilla LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 334 (at sea about 30 miles from Hispaniola).

The ovenbird is rather rare in forested areas as a winter resident and passage migrant. Near Tres Zapotes in 1939 I found one recently dead on March 24, and shot one on April 8. The following year Carriker secured specimens March 3 and April 1, and on February 10 he collected one at El Conejo.

SEIURUS MOTACILLA (Vieillot): Louisiana Water-thrush

Turdus motacilla VIEILLOT, Histoire naturelle des oiseaux de l'Amérique septentrionale, vol. 2, 1807 (1808?), p. 9, pl. 65 (Kentucky).

Near Tres Zapotes I saw one in swampy woods on March 17 and another March 23. March 25 I recorded several along the Arroyo del Sitio, and shot an adult male that was as fat as any bird that I have ever handled.

SEIURUS NOVEBORACENSIS NOTABILIS Ridgway: Grinnell's Water-thrush

Seiurus naevius notabilis RIDGWAY, Proc. U. S. Nat. Mus., vol. 3, 1880, p. 12 (Como, Carbon County, Wyo.).

Near Tres Zapotes these birds were common from March 27 to April 13, 1939, two being taken on March 28 and April 13. Carriker in 1940 found them abundant at Tlacotalpam in February and prepared specimens on February 6 and 8. He also shot one at El Tular at 3,200 feet elevation on Volcán San Martín. The five taken are all of the race *notabilis*.

OPORORNIS FORMOSUS (Wilson): Kentucky Warbler

Sylvia formosa WILSON, American ornithology, vol. 3, 1811, p. 85, pl. 25, fig. 3 (Kentucky).

The Kentucky warbler, found in thickets and forest, is more common than the hooded warbler in the region. Our specimens were taken as follows: Near Tres Zapotes, March 21 and 25 and April

8, 1939, and January 19, February 28, and March 4, 1940; between 1,000 and 2,500 feet elevation on Cerro de Tuxtla, April 1, 1940.

OPORORNIS PHILADELPHIA (Wilson): Mourning Warbler

Sylvia Philadelphia WILSON, American ornithology, vol. 2, 1810, p. 101, pl. 14, fig. 6 (within a few miles of Philadelphia, Pa.).

Carriker secured three of these birds, all males, near Tres Zapotes on May 3, and on the lower slopes of Cerro de Tuxtla on May 7 and 10, 1940. Their winter home apparently is farther south, and because of the time of migration they have been missed in Mexico by most collectors. Ridgway⁶⁵ knew of no valid records. Recently the National Museum has received another male from A. E. Colburn taken by P. W. Shufeldt in southern Veracruz, but without certain data. The late dates for the Tres Zapotes specimens indicated rapid northward migration for this species.

GEOTHYLIS TRICHAS TRICHAS (Linnaeus): Maryland Yellowthroat

Turdus trichas LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 293 (Maryland).

Four specimens assigned to the typical race were secured at Tlacotalpam on February 6, 1940, and near Tres Zapotes on March 21, 1940, and April 11, 1939. These are lighter, less greenish above, and lighter yellow below than the other races secured at this point. All are males, with wing measurements of 51.4, 52, 54, and 54.5 mm.

GEOTHYLIS TRICHAS BRACHIDACTYLA (Swainson): Northern Yellowthroat

Trichas brachidactylus SWAINSON, Animals in menageries, 1838, p. 295 (northern provinces of the United States).

The four obtained were collected at Tres Zapotes on March 18, 1939, and March 27, 1940, and Tlacotalpam on February 16 and 19, 1940. These are distinguished from *trichas* by more greenish color above and by more extensive yellow below.

GEOTHYLIS TRICHAS TYPHICOLA Burleigh: Athens Yellowthroat

Geothlypis trichas typhicola BURLEIGH, Proc. Biol. Soc. Washington, vol. 47, Feb. 9, 1934, p. 21 (Athens, Ga.).

The four skins obtained were all secured at Tres Zapotes, January 18, 20, and 29 and March 5, 1940. These are decidedly deeper yellow below, with darker flanks and darker dorsal surface than any of the other yellowthroats secured. Their presence as winter migrants here in southeastern Mexico is of interest in view of the present known range of the subspecies in the southeastern United States. Oberholser⁶⁶ has reported *typhicola* as casual in southern Louisiana as a migrant and in winter.

⁶⁵ U. S. Nat. Mus. Bull. 50, pt. 2, 1902, p. 629.

⁶⁶ Louisiana Dept. Conservation Bull. 28, 1938, p. 561.

Yellowthroats are common as winter visitors to weed grown fields and grassy pastures, though sometimes difficult to see as they keep well under cover. Unless clearly observed at times they are hard to distinguish from the *Chamaethlypis* that frequent the same coverts. The three races of *trichas* identified seem to range together. Our 12 specimens of all include 11 males and 1 female.

CHAMAETHLYPIS POLIOCEPHALA PALPEBRALIS (Ridgway)

Geothlypis (*Chamaethlypis*) *palpebralis* RIDGWAY, Manual of North American birds, 1887, pp. 526, 592 (Mirador, Veracruz).

This is a resident species, common in the Tres Zapotes region wherever bushes are scattered through the grasslands. They kept under cover ordinarily, flying out occasionally as I passed, or were seen as they sang from the tops of bushes or tall grass stems. The song is a low, rather inconsequential warble of several notes. I had a better view of them at times in crossing these savannas on mule back, as then from the elevation of the saddle I could see about more, and the birds were less wary. They tend always to be inconspicuous and to slip aside. They suggested the yellowthroats of the north in most of their habits.

We secured a series at Tres Zapotes, while Carriker shot one at Tapacoyan and one between 1,000 and 2,000 feet elevation on Cerro de Tuxtla, both on May 5. He collected two more at about 2,500 feet on Volcán San Martín, April 21. All these are typical of the race *palpebralis*.

On comparison of material in the U. S. National Museum it is evident that specimens from near Brownsville, Tex., in the lower Rio Grande Valley, differ from typical *poliocephala* in significantly paler color, with less yellow on the lower surface. They are to be separated therefore as *Chamaethlypis poliocephala ralphi* (Ridgway)⁶⁷ in spite of the fact that Ridgway in his last account of the species⁶⁸ placed the Texas birds under typical *poliocephala*. With a good series of skins the differences are clearly evident.

ICTERIA VIRENS VIRENS (Linnaeus): Yellow-breasted Chat

Turdus virens LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 171 (South Carolina, 200 or 300 miles from the sea).

Our small series from Tres Zapotes includes birds taken between January 17 and March 10. I recorded them in 1939 until April 9.

Carriker found chats abundant in January but noted some decrease later. They were seen regularly around camp, and occasionally they

⁶⁷ *Geothlypis poliocephala ralphi* Ridgway, Proc. U. S. Nat. Mus., vol. 16, Feb. 5, 1894, p. 692 (Brownsville, Tex.).

⁶⁸ U. S. Nat. Mus. Bull. 50, pt. 2, 1902, p. 689.

came out into open branches to rest with jerking tail and clucking notes. The habit seemed curious in view of their secretive nature in the north. I observed one at camp with the forehead and an irregular ring around the neck light yellow. On March 10 I saw one driving another through a thicket, possibly through some territorial reaction.

GRANATELLUS SALLAEI SALLAEI (Bonaparte)

Scotophaga sallaei "Bp. et Selater," BONAPARTE, Compt. Rend. Acad. Sci. Paris, vol. 42, May 1856, p. 957 (Córdoba, Veracruz).

On March 11, 1939, near Tres Zapotes I took one male of two that were moving about with tails wide spread on twigs and logs above the ground in a wet thicket. Carriker shot another male among small trees in rather open forest toward Tapacoyan on February 24. This species is not common in collections.

WILSONIA CITRINA (Boddaert): Hooded Warbler

Muscicapa Citrina BODDAERT, Table des planches enluminées, 1783, p. 41 (Louisiana).

This species is not uncommon as a winter resident in the lowland forests and thickets where it ranges near the ground. Dates on which we secured specimens are as follows: March 30, 1939, and January 19, February 9 and 23, and March 3 and 18, 1940.

WILSONIA PUSILLA PUSILLA (Wilson): Wilson's Warbler

Muscicapa pusilla WILSON, American ornithology, vol. 3, 1811, p. 103, pl. 26, fig. 4 (southern New Jersey).

One male and two females of the typical race of this warbler were taken at Tres Zapotes on March 4 and 26 and on the summit of Volcán San Martín on April 22.

WILSONIA PUSILLA PILEOLATA (Pallas): Northern Pileolated Warbler

Motacilla pileolata PALLAS, Zoographia Rosso-Asiatica, vol. 1, 1811, p. 497 (Kodiak Island, Alaska).

Specimens of the northern pileolated warbler were taken at Tres Zapotes on January 27, February 26, and April 2 and at Tlacotalpam on February 6, 1940. It would appear that this form is a regular winter resident in this area.

WILSONIA PUSILLA CHRYSOLA Ridgway: Golden Pileolated Warbler

Wilsonia pusilla chryseola RIDGWAY, U. S. Nat. Mus., Bull. 50, pt. 2, 1902, p. 714 (Red Bluff, Calif.).

The golden pileolated warbler is represented by a female taken on March 8, 1939, and by a male shot on March 26, 1940.

WILSONIA CANADENSIS (Linnaeus): Canada Warbler

Muscicapa canadensis LINNAEUS, *Systema naturae*, ed. 12, vol. 1, 1776, p. 327 (Canada).

Carriker shot one on the higher slopes of Volcán San Martín on April 16, 1940, and another on Cerro de Tuxtla, May 7. Both are males.

SETOPHAGA RUTICILLA (Linnaeus): American Redstart

Motacilla Ruticilla LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 186 (Virginia).

The redstart was fairly common near Tres Zapotes, where Carriker shot one on January 27, 1940, indicating its presence through the winter. In 1939, through March and until April 10, I recorded the species nearly every day. Carriker saw it in the Sierra de Tuxtla up to 2,000 feet elevation. In one adult male taken the wing spot is small, while in two others it is decidedly more extensive, illustrating the usual variation in this regard.

Redstarts came regularly to small trees in the little clearing in which stood the houses of our camp, so that I noted them constantly from the porch under which I prepared my specimens. On March 19 and 20 one female, marked by ragged feathering, ranged within a space 35 feet long by 20 feet wide around a small group of shrubs and little trees at the border of the clearing mentioned. Once I saw it fly across to another clump of trees to join a flock of passing migrants made up of parula and magnolia warblers, but soon it was back, going over and over its selected area in search for insects. The very limited space that it chose was remarkable, especially since to my eye there was nothing to single out the few square feet of territory that it selected from miles of similar country on all sides. It seemed an indication of rather sedentary habit on the part of one of our birds from the north when in its winter home.

MYIOBORUS MINIATUS MOLOCHINUS Wetmore

Myioborus miniatus molochinus WETMORE, *Proc. Biol. Soc. Washington*, vol. 55, Aug. 13, 1942, p. 105 (between 3,000 and 4,000 feet elevation on Volcán San Martín, Sierra de Tuxtla, Veracruz, Mexico).

Carriker found this bird above 2,500 feet elevation on Volcán San Martín but did not record it on the Cerro de Tuxtla. It was active and conspicuous in the taller undergrowth and smaller trees of the forest. Male and female were taken on April 16 and other males on April 17 and 23.

When compared with *Myioborus m. miniatus* (Swainson), which is found in the main mountain ranges to the west and northwest, *molochinus* differs in the darker dorsal surface, including the wings and the sides of the head and neck, the brighter brown crown patch, the

brighter red of the breast and abdomen, the less extensive white of the under tail-coverts, and in the length of the tail, which is shorter than the wing instead of the reverse. In three males the average length of the wing is 66.7 and the tail 64.2 mm., and in one female these dimensions are 62.4 and 61.5 mm., respectively.

BASILEUTERUS CULICIVORUS CULICIVORUS (Lichtenstein)

Sylvia culicivora LICHTENSTEIN, Preis-Verzeichniss mexicanischer Vögel, 1830, p. 2 (Jalapa, Veracruz).

Carriker found this warbler to be one of the most common birds on Cerro de Tuxtla, where he secured specimens on March 11, 19, and 29, April 1, 3, and 9, and May 6, 1940. It was found mainly above 1,000 feet elevation, ranging in the undergrowth and lower trees. In the lowlands it is a straggler, as Carriker secured one near Tlacotalpam on February 7 and one at Tres Zapotes on January 26.

BASILEUTERUS BELLI SCITULUS Nelson

Basilcuterus belli scitulus NELSON, Auk, 1900, p. 268 (Todos Santos, Huehuetenango, Guatemala).

Carriker secured two males and a female on the higher slopes of Volcán San Martín on April 20 and 22, 1940. They were found from 3,500 feet elevation to near the summit, in undergrowth and the smaller trees of the forest.

These birds are listed here under the name *scitulus* though with more material the birds of Volcán San Martín may prove distinct. They are definitely darker above than *B. b. belli*, agreeing in this with *scitulus*, but appear slightly smaller, the wing in the two males being 56.3 and 57 mm. and in the female 53.2, dimensions that are within the lower limits of the other forms. This is another case where a species from this mountain shows affinity with mountain forms of Chiapas and Guatemala rather than with those of the Mexican tableland proper.

BASILEUTERUS RUFIFRONS SALVINI Cherrie

Basileuterus salvini CHERRIE, Proc. U. S. Nat. Mus., vol. 14, Sept. 4, 1891, p. 342 (Cobán, Vera Paz, Guatemala).

Specimens were obtained at Tres Zapotes, March 24 and 28 and April 6, 1939, and January 20 and April 5 and 8, 1940; Tapacoyan, May 5, 1940; on Cerro de Tuxtla, May 4, 1940; and on Volcán San Martín, April 21, 1940. In the mountains they occurred to 3,000 feet elevation. They range in thickets, keeping well under cover and occasionally venturing out into growths of weeds. On April 6 I shot a breeding pair, and on April 9 I saw two more that were obviously mated.

All these birds have the abdomen partly yellow, this condition ranging from a faint wash to a condition of quite solid color. They

represent definitely the style of coloration recognized under the name *salvini* and are all identified as that race. Variation among them is due probably to intergradation toward *rufifrons*.

Family ICTERIDAE

GYMNOSTINOPS MONTEZUMA (Lesson)

Cacicus Montezuma LESSON, Centurie zoologique, livr. 2, Oct. 1830, p. 33, pl. 7 (Mexico).

Carriker saw a pair near camp at Tres Zapotes late in February 1940, and on March 8, Modesto, his assistant, shot a male near Hueyapa. The species is rare in this area.

AMBLYCERCUS HOLOSERICEUS HOLOSERICEUS (Lichtenstein)

Sturnus holosericeus LICHTENSTEIN, Preis-Verzeichniss mexikanischer Vögel, 1830, p. 1 (Alvarado, Veracruz).

Our series includes specimens from Tres Zapotes, March 8, 10, and 30, 1939, and January 26 and February 23, 1940, and from Tlacotalpam, February 6, 7, 15, and 19. Usually these birds were found in heavy forest, where they were shy and difficult to see. Carriker noted them more commonly at Tlacotalpam in low, tangled woodland around the ponds so numerous there. In March, when the corn ripened, they came into the fields from the surrounding thickets, keeping under cover in the main and not flying in the open like the marauding blackbirds. At any alarm they flew precipitately to heavy cover. Sometimes I found small flocks resting low down in the thickets bordering the milpas, singing musically, but though I heard them near at hand it was difficult to see them. The natives consider them destructive. Because of the light-colored bill they call them *pico de hueso* or *pico cerillo*, cerillo being the common name for light-colored matches made of wax.

TANGAVIUS AENEUS AENEUS (Wagler): Red-eyed Cowbird

Psarocolius aeneus "Licht." WAGLER, Isis von Oken, vol. 22, 1829, col. 758 (Laguna, Veracruz, Mexico).

Birds taken by Carriker at Tlacotalpam on February 15 and at Tres Zapotes on March 3 are all in immature dress. On April 8, 1939, I killed three adult males at the latter point and found them in partial molt. Carriker saw the species at Tapacoyan.

Red-eyed cowbirds were found in small flocks, regularly at the village, and also around the lagoons. As the corn matured they spread out through the fields to feed on the grain in company with *Cassidix*, and at times I saw them in such localities in flocks. When the ears were ripened the natives went into the fields to bend or break

the stalks at an abrupt angle below the ears, so that these instead of standing upright were turned down toward the ground and were covered by the stalks above. Whole fields treated in this way presented a curious appearance. The theory was that the ears were thus hidden so that they were protected from damage by birds. Before this, while grain was in the milky stage, men and boys went out at dawn to the fields armed with slings and slingshots, or with clods to be thrown by hand. They stood on small elevated platforms of poles that gave them clear view across the corn, where by shouting and by casting missiles they kept the birds moving and so prevented damage.

On April 12 early in the morning a flock passed traveling north, and on April 14 three bands of 50 to 75 each traveled in the same direction, with their wings making a loud rushing sound. As there had been no indication for some time of morning and evening flight, I was of the opinion that these were migrants bound for the more northern parts of the breeding range. On April 15, on the morning of our departure, I recorded one more group.

The natives called this species *tordo*. Often as they rested in the sun I noted the reddish-brown color of the eyes of these cowbirds.

MOLOTHRUS ATER ATER (Boddaert): Eastern Cowbird

Oriolus ater BODDAERT, Table des planches enluminées, 1783, p. 37 (South Carolina).

The only one recorded is a female taken by Carriker at Tlacotalpam on February 16, 1940. This bird, here as a migrant, is representative of the eastern race, having the following measurements: Wing 101.4, tail 66.5, culmen from base 15, tarsus 26 mm.

CASSIDIX MEXICANUS MEXICANUS (Gmelin)

Corvus mexicanus GMELIN, Systema naturae, vol. 1, pt. 1, 1788, p. 375 (Veracruz, Veracruz, Mexico⁶⁹).

I shot a pair at Tres Zapotes on March 16, 1939, and Carriker secured 3 males and 3 females at Tlacotalpam on February 8, 9, and 16, 1940.

This is one of the conspicuous birds of the region. In Veracruz City I found them in parks and along the boulevards, as well as in the suburbs. In Alvarado they were common and familiar along the waterfront street, and from Tlacotalpam to Boca San Miguel they were seen constantly. During March at Tres Zapotes a number occupied a roost near the village, so that there was regular morning

⁶⁹ Designated by G. H. Lowery, Jr., Occ. Papers Mus. Zool. Louisiana State Univ., No. 1, May 4, 1938, p. 4.

and evening flight of little flocks past our camp. By the end of the month they were divided in pairs. On March 17 I saw a female carrying nesting material to a crotch 40 feet from the ground in a tree in the village, and on March 23 a pair was seen at a nest in a palm top at Laguna del Tular. About the houses they were most familiar, especially near the arroyo. While they ranged throughout the fields to feed they were most frequent near water. The natives called them *picho*.

DIVES DIVES DIVES (Lichtenstein)

Icterus Dives LICHTENSTEIN, Preis-Verzeichniss mexicanischer Vögel, 1830, p. 1 (Mexico).

This fairly common species is represented by skins taken at Tres Zapotes on March 24 and 31, 1939, and March 3 and 4 and April 6, 1940. Carriker shot one at Tlacotalpam on February 16, 1940.

Sumichrast's blackbird, while resembling many other blackbirds in its uniform dark coloration, is more like an oriole in habits, as it ranges mainly in trees and thickets and seldom comes down on the ground. It was found in pairs and small flocks, usually in woodland, but in March when corn was ripe I saw them occasionally flying over the fields. One pair ranged among scattered palms in an area of abandoned milpas near camp, where often in the heat of the day I saw them resting on shaded perches, panting with open bills. Near the village I found pairs at the border of open groves, and they sometimes came into dead trees at the edge of woodland. As they moved about the tail was jerked up and down constantly in a decidedly greater arc of movement than in other blackbirds. The song is musical and pleasing.

The contention of Hellmayr⁷⁰ that this bird of Central America is conspecific with *Dives warszewiezi* and *D. kalinowskii* of Ecuador and Perú is one that may be accepted but one that should be scrutinized to determine whether it is entirely correct. The first species mentioned is so much smaller in all dimensions that its differences are easily evident as a series of birds is laid out for examination. It is obviously a dwarf member of the group and may possibly be specifically separable. The disparity in size for example is almost as great as that existing between an ordinary rusty blackbird (*Euphagus carolinus*) and a grackle (*Quiscalus*). *Dives kalinowskii* is somewhat larger than the northern bird. It is not impossible that when the three are better known all may prove to be distinct species.

⁷⁰ Publ. Field Mus. Nat. Hist., zool. ser., vol. 13, Apr. 12, 1937, pp. 96-99.

ICTERUS GALBULA (Linnaeus): Baltimore Oriole

Coracias Galbula LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 108 (Virginia).

This oriole was not common in 1939. I saw one on March 18, and shot an adult male April 10 at Tres Zapotes. Carriker secured females here in 1940 on January 18 and 25, and an adult male on Cerro de Tuxtla, April 9.

ICTERUS SPURIUS (Linnaeus): Orchard Oriole

Oriolus spurius LINNAEUS, *Systema naturae*, ed. 12, vol. 1, 1766, p. 162 (South Carolina).

Near Tres Zapotes this oriole was common and was present through the winter, as Carriker secured a male on January 20 and a female on January 26. We took a number of specimens in March and April. In 1939 I noted definite migratory movement among them from March 20 to 22, when they were present in abundance through the thickets and the overgrown abandoned milpas. On March 31 another migration wave passed with the birds everywhere from low brush to the tree tops. On April 6 and 10 they were seen in large numbers sometimes in flocks, and on April 13 they were noted in small loosely formed flocks at the Arroyo Teponaguasapan. I saw them on April 15 on my last day in the field. On the days when they were in migration they were so widespread that it was necessary to scrutinize carefully every bird that I collected to avoid taking orchard orioles that I did not want. They called but I heard none singing.

ICTERUS FUERTESI Chapman

Icterus fuertesi CHAPMAN, *Auk*, 1911, p. 3, pl. 1 (Paso del Haba, south shore of Río Tamesi, 35 miles northwest of Tampico, Tamaulipas).

Among the orioles secured by Carriker there is a fine adult male of this bird taken at Tlacotalpam, May 17, 1940. This is in full plumage and agrees closely in the light, buffy brown color of the under surface and rump with the plate accompanying the original description. It is, however, definitely larger than the specimens obtained by Dr. Chapman in Tamaulipas, being similar in size to the smaller individuals of *Icterus spurius*. The measurements are as follows: Wing 76, tail 65.6, culmen from base 17.5, tarsus 21.2 mm.

A female collected by Carriker on May 15, 1940, near the coast at El Conejo I have also identified as *fuertesi*. It is in slightly worn plumage and when compared with *Icterus spurius* in similar stage differs in faintly paler hue of the under surface and the rump. Like the male from Tlacotalpam it is larger than the female described by Dr. Chapman from Tamaulipas, as it measures as follows: Wing 72.5,

tail 62.5, culmen from base 17.4, tarsus 21.5 mm. Its dimensions therefore come within those of *spurius*.

These two records seem to indicate a range for this type of oriole extending along the coastal plain from southern Veracruz to southern Tamaulipas. The color difference between *fuertesi* and *spurius* appears analogous to that noted recently by Burleigh in the barn swallow, where he has described as *Hirundo rustica insularis*⁷¹ the birds lightly pigmented with brown that nest on islands along the Gulf coast of the United States from southeastern Louisiana to western Alabama.

ICTERUS PROSTHEMELAS (Strickland)

Xanthornus prothemelas STRICKLAND, Contributions to ornithology, 1850, p. 120, pl. 62 (Guatemala).

Although this is the rarest of the orioles in this section, we secured several at Tres Zapotes on April 10 and 12, 1939, and February 22, 1940, and at El Conejo on February 12, 1940. I found them in forest trees where these bordered milpas. In flight they appear noticeably longer-tailed in proportion to their size than other species of the genus found here. Four of the seven taken have the greenish-yellow back of what is considered second year dress, while the remaining three have the dorsal surface entirely black.

Hellmayr's thesis⁷² that this oriole is specifically related to *Icterus northropi* Allen of Andros, Little Andros, and Abaco Islands in the Bahamas is interesting but is one that requires more consideration before acceptance. Unquestionably the two are closely related, but the Bahaman birds to me seem merely to preserve a coloration that may be more primitive. Proportions are quite similar except that *northropi* has a longer bill and is less richly colored, the yellow being lighter and more greenish, and the black on the breast less extensive.

ICTERUS MESOMELAS MESOMELAS (Wagler)

Psarocolius mesomelas WAGLER, Isis von Oken, 1829, col. 755 (Mexico).

Our specimens come from Tres Zapotes, March 11, 23, and 27, 1939, and February 23 and March 14, 1940, and from Tlacotalpam, February 7 and 15, 1940. This bird, known as the *calandria*, a name given to all orioles, is not common. It ranges under cover of leaves and so is easily missed, except when seen in flight. I found it among groves in open pastures, and in the thickets that covered abandoned fields. One came to the clearing at our camp to give a mellow, warbling song, quite different from that of our northern orioles.

⁷¹ *Hirundo rustica insularis* Burleigh, Occ. Papers Mus. Zool. Louisiana State Univ., No. 11, Mar. 4, 1932, p. 179 (Ship Island, 16 miles offshore from Gulfport, Miss.).

⁷² Publ. Field Mus. Nat. Hist., zool. ser., vol. 13, pt. 10, Apr. 12, 1937, pp. 115-117.

ICTERUS GULARIS TAMAULIPENSIS Ridgway

Icterus gularis tamaulipensis RIDGWAY, Proc. Washington Acad. Sci., vol. 3, Apr. 15, 1901, p. 152 (Alta Mira, Tamaulipas).

Taken at Tres Zapotes, March 9 and April 11, 1939, February 24 and March 25, 1940; at Tlacotalpam, February 7 and 19, 1940; and at El Conejo, February 12, 1940.

These birds were found through the tree tops in heavy forest, in the lines of trees bordering fields and streams, and in scattered groves through the pastures. They were the most common of the orioles and were often kept as cage birds. The song is a quick repetition of two or three notes without the clear tone of that of the Baltimore oriole or the troupial, though the alarm calls are like those of the northern orioles. On April 11 I recorded two nests under construction, one placed conspicuously in the top branch of a small tree in a pasture and the other at the end of a branch in a huge tree growing over the arroyo at the village. Both were of the usual purselike, hanging type and were of large size.

This oriole is generally similar to *Icterus mesomelas mesomelas* but is marked by much larger size, more orange-yellow color, and much heavier bill, particularly in the lower mandible.

AGELAIUS PHOENICEUS RICHMONDI Nelson

Agelaius phoeniceus richmondi NELSON, Auk, 1897, p. 58 (Tlacotalpam, Veracruz).

Our excellent series includes two males from Tres Zapotes, April 11, 1939, and a series of males and females from Tlacotalpam, February 5, 7, 9, 19, and 20, 1940. In 1939 near Boca San Miguel I found red-winged blackbirds common on March 6 and April 15. At Tres Zapotes I noted a flock of a hundred along the arroyo at the village, and at the end of the month I located a little colony at Laguna Larga a short distance from town. Here the birds remained in the main in the sedges growing in locations where I could not reach them because of the depth of the mud. Finally on April 11 I shot two adult males that came out to feed on the fruits of a palo mulato on higher ground. Though I heard them singing a typical redwing song, this was not their breeding season, as the sexual organs were not active. Carriker found redwings abundant along the river and through the ponds and marshes at Tlacotalpam.

Our series comes mainly from the type locality of the race at Tlacotalpam, while the two from Tres Zapotes are only a short distance away. The females are obviously different from those of *A. p. megapotamus* from southern Texas and northeastern Mexico, and the males average a little smaller. Measurements of available topotypes of *richmondi* are as follows:

Thirteen males, wing 104.6–116.5 (110.3), tail 74.9–87.2 (82), culmen from base 25.4–27.2 (25.6), tarsus 28.3–30.9 (29.7) mm.

Five females 85.6–92.5 (88.3), tail 63.3–73.3 (66.88), culmen from base 22–23.2 (22.4), tarsus 24.5–26.9 (25.3) mm.

In the National Museum there is a small series of redwings from Montecristo, Tabasco, in the drainage of the Río Usumacinta about 40 miles in an airline farther inland from Palizada, Campeche, type locality of the recently described *A. p. matudae*.⁷³ As a matter of interest I have checked these against the Tlacotalpam series. Their measurements are as follows:

Three males, wing 104.1, 111.5, 114.4, tail 72.6, 80.7, 84.8, culmen from base 25.1, 25.5, 25.6, tarsus 28, 28.2, 29.8 mm.

Seven females, wing 89.6, 90.9, 92, 92.2, 92.5, 93.2, 93.5, tail 64.7, 64.9, 64.9, 66.3, 66.8, 68.6, 70.9, culmen from base (6 only) 20.6, 20.6, 20.6, 20.8, 20.8, 20.9, tarsus 23.2, 24.2, 24.5, 24.7, 24.9, 25.5, 26 mm.

These dimensions coincide so closely with those given for *richmondi* as to indicate no evident difference. The females taken by Nelson and Goldman at Montecristo on May 10, 1900, are in rather more worn plumage than part of the birds from Tlacotalpam, but when compared with the worn specimens from that point they are closely similar in color.

STURNELLA MAGNA MEXICANA Sclater

Sturnella mexicana P. L. SCLATER, Ibis, 1861, p. 179 (Jalapa, Veracruz).

In 1939 I found occasional meadowlarks on the little savanna below our camp, taking pairs on April 5 and 10. At this time they were in song and were preparing to nest, their song, call notes, and habits being similar to those of the meadowlark of the eastern United States. They are resident in this vicinity, as Carriker, in 1940, secured specimens on January 25, as well as later on March 6 and 7. He shot two near Tlacotalpam on February 16. The bird is known locally as *frijolera*.

Family THRAUPIDAE

TANAGRA LAUTA LAUTA Bangs and Penard

Tanagra lauta lauta BANGS and PENARD, Bull. Mus. Comp. Zool., vol. 63, 1919, p. 35 (Guatemala).

Near our camp at Tres Zapotes these euphonias were common. Carriker noted that they were much in evidence in January about clumps of mistletoe in trees in the pastures. His three specimens were secured on January 18 and 20. In March and April, 1939, I shot several, finding them in heavy woods and also in more open

⁷³ *Agelaius phoeniceus matudae* Brodkorb, Auk, 1940, p. 548 (Palizada, Campeche).

areas near camp. They fed on mistletoe berries mainly, but I also observed them working through leaves and smaller branches in the trees and over the seed heads of palms standing in open fields. Males in partly immature dress taken on March 25 and April 6 had the testes about one-half developed. During April I heard their calls constantly near camp but seldom saw them, as they are small in size and remained quiet without much movement. This seemed to be their nesting season. The flight is somewhat undulating where they are observed in the open. Their chattering calls and whistled notes seemed to be somewhat less musical than those of the West Indian forms with which I have been most familiar.

TANAGRA GOULDI GOULDI (Sclater)

Euphonia Gouldi P. L. SCLATER, Proc. Zool. Soc. London, June 6, 1857, p. 66, pl. 124 (Guatemala).

On Cerro de Tuxtla, on March 29, 1940, Carriker found a pair with a band of forest birds and collected the male. This bird and another male that was taken by Nelson and Goldman at Motzorongo, Veracruz, March 3, 1894, the only two available from the extreme northern part of the range, have definitely heavier bills than any others seen. The difference is especially noticeable when comparison is made with Costa Rican specimens.

THRAUPIS EPISCOPUS DIACONUS (Lesson)

Tanagra (Aglaia) diaconus LESSON, Rev. Zool., June 1842, p. 175 (Realejo, Nicaragua).

This tanager is here not far from its northern limit, and in the region that we worked it occurred sparingly. In 1939 I recorded only a few, securing my first specimen on April 11 from a tree top high above the arroyo at the village, and another at the Arroyo Tepanaguasapan on April 13. Carriker in 1940 shot two at Tres Zapotes on March 25 and May 2 and two at El Conejo on February 12. He saw a few at Tlacotalpam in May.

THRAUPIS ABBAS (Lichtenstein)

Tanagra Abbas LICHTENSTEIN, Preis-Verzeichniss mexicanischer Vögel, 1830, p. 2 (Oaxaca,⁷⁴ Mexico).

This is a common forest bird around Tres Zapotes, and is represented by a series taken throughout the period of our work. Usually it is a forest species, being found in little flocks of 6 or 8 that remain fairly close together. In more open areas they come to small trees where these are in fruit. Carriker found a pair at El Conejo on May 15 in a small clump of trees growing in the open at a distance from

⁷⁴ See van Rossem, Bull. Mus. Comp. Zool., vol. 77, 1934, p. 419.

forest. They are heavy-bodied birds with relatively small heads, often showing the yellow spot in the wing distinctly when in flight.

PHLOGOTHRAUPIS SANGUINOLENTA SANGUINOLENTA (Lesson)

Tanagra (Tachyphonus) sanguinolentus LESSON. Centurie zoologique, 1831, p. 107, pl. 39 (Mexico).

Our series includes birds from Tres Zapotes, March 9 and 16, 1939, February 24, March 15 and 18, and April 1, 1940. Carriker shot one on the lower slopes of Cerro de Tuxtla on May 7. This beautiful tanager is an inhabitant of dense coverts, either in heavy forest or in thickets bordering fields. Its contrasted color pattern of black and red and its light bill attract the eye immediately when it appears. It is shy and may be more common than our records indicate.

PIRANGA RUBRA RUBRA (Linnaeus): Summer Tanager

Fringilla rubra LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 181 (South Carolina).

On March 12, 1939, a fine male came to the grove of little trees at our Tres Zapotes camp, and apparently this same individual was recorded here almost daily until April 2. On April 3 I shot an adult female and on April 6 a particolored male. I recorded the last one on April 8. Carriker shot a male partly in immature dress on Volcán San Martín on April 22, 1940.

PIRANGA LEUCOPTERA LEUCOPTERA Trudeau

Pyrranga leucoptera TRUDEAU, Journ. Acad. Nat. Sci. Philadelphia, vol. 8, 1839, p. 160 (Mexico).

Our only record is of two beautiful adult males taken by Carriker on March 23, 1940, on the high, exposed ridge forming the lower summit of Cerro de Tuxtla.

HABIA RUBICA RUBICOÏDES (Lafresnaye)

Saltator rubicoïdes LAFRESNAYE, Rev. Zool., 1844, p. 41 (Mexico).

Around Tres Zapotes Carriker and I found this bird occasionally, sometimes at least mixed with the larger species that occurs in this same area. I shot one on April 4, 1939, from such a mixed flock at Arroyo Corredor. Carriker took others in the Tres Zapotes area on January 17, February 26, and March 3, 1940. On Cerro de Tuxtla he found them common to 2,500 feet and collected a good series. They seemed less numerous on Volcán San Martín. Two males from Tuxtla, taken on April 1 and 9, were in breeding condition but were still in immature dress in which they resemble the female except for slightly darker color. These tanagers range in undergrowth and the smaller trees in the forest, rarely going high above the ground. They travel in little flocks.

HABIA SALVINI SALVINI (Berlepsch)

Phoenicothraupis salvini BERLEPSCH, Ibis, 1883, p. 487 (Vera Paz, Guatemala).

This is one of the most common tanagers around Tres Zapotes, being represented in our collection by an excellent series. They were found in small flocks in heavy forest, where they ranged through the bushes and lower trees, chattering and calling as they moved along. They were readily decoyed and sometimes came up very close to me. Often I recorded several flocks in the course of a day. On Cerro de Tuxtla Carriker secured specimens on March 13 and May 9, finding them rather rarely to 2,500 feet elevation. He shot one breeding male on May 9 in full immature dress.

Our series agrees with *salvini* in general and shows no approach to *littoralis*. I am not certain that this form and its close relatives are specifically allied to the more southern *gutturalis*. It is interesting that the smaller species, *H. r. rubicooides*, with dull-orange crown spot in the female and black-bordered crown spot in the male, was common in the mountains and rare in the lowlands, while with the present bird the reverse was true.

LANIO AURANTIUS Lafresnaye

Lanio Aurantius LAFRESNAYE, Rev. Zool., 1846, p. 204 (Guatemala).

Carriker found this one of the more abundant birds in the Sierra de Tuxtla, where it ranged in wandering bands, usually high in the trees. He noted that the call note was loud. On Cerro de Tuxtla he took specimens on March 19, 23, and 29, April 3 and 9, and May 4 and 6. He recorded them also on Volcán San Martín. Apparently they may wander somewhat during the colder weather, as he shot specimens at Tres Zapotes on January 26 and February 28.

That *Lanio leucothorax* in its geographic variation includes *melanopygius* and related subspecies is easily evident. But Hellmayr's treatment of all these as conspecific with *Lanio aurantius* has no basis in fact. At present there appear to be no forms of *aurantius*, though it may be noted that females in the present series from Veracruz appear a little duller on the dorsal surface than a few old skins from Guatemala.

EUCOMETIS PENICILLATA PALLIDA Berlepsch

Eucometis spodocephala pallida BERLEPSCH, Auk, 1888, p. 451 (Yucatán).

On March 31, 1939, Ramón brought one from the village that his brother had killed with a stone. I saw one several times at camp where it came out of a little thicket to snatch berries growing at the border and then slipped back into cover.

There is another specimen in the National Museum collection from Buena Vista, Veracruz, taken on June 4, 1901, received from A. E.

Colburn. These seem to constitute the first published records for this area and mark an extension of the known range. The two specimens, both females, appear very slightly paler yellow below than the few skins I have seen from Yucatán.

CHLOROSPINGUS OPHTHALMICUS OPHTHALMICUS (Du Bus)

Arremon ophthalmicus Du Bus. Bull. Acad. Roy. Sci. Belgique, vol. 14, 1847, p. 106 (Mexico).

Carriker found this species in fair number on Volcán San Martín, where he took four specimens at above 3,500 feet elevation on April 18, 20, and 22. Apparently in the colder period it may wander to the lowlands, as he shot one near our camp at Tres Zapotes on January 17.

Family FRINGILLIDAE

SALTATOR ATRICEPS SUFFUSCUS Wetmore

Saltator atriceps suffuscus WETMORE. Proc. Biol. Soc. Washington, vol. 55, Aug. 13, 1942, p. 106 (Tres Zapotes, Veracruz, Mexico).

This is one of the common resident species around Tres Zapotes that is recorded almost daily. Strangely enough, the birds of this region differ from others of the species throughout its extensive range from Tamaulipas to Panamá in having the throat deep brown, a mark so prominent as to be readily evident in life. I noted this in 1939, and the following season Mr. Carriker devoted definite attention to the matter with the result that we assembled an excellent series, which demonstrates that a well-marked form is concerned.

The peculiarity of the brown throat has been noted rather casually in a few specimens by other authors but for various reasons has been considered an individual variation. P. L. Selater⁷⁵ described *atriceps* as having "a large white (sometimes dark chestnut) guttural patch," remarking further that the "throat-spot, clear white in most specimens, is dark chestnut in some Mexican examples, and in others tinged with rufous." Salvin and Godman⁷⁶ wrote that "a rarer form of variation is in the color of the throat, which in some specimens, usually Mexican, is of a rich chestnut instead of white; but intermediate forms occur connecting the two." Ridgway⁷⁷ noted of *atriceps* that "this white throat patch is sometimes tinged with tawny or chestnut, and according to Dr. Selater is even occasionally dark chestnut." I have seen no other statements on this subject.

The color of the throat is easily seen in these birds in life as remarked above, and the brown color is characteristic in the Tres Zapotes area. In our 24 skins from this point there is one male (No. 360403) with the

⁷⁵ Catalogue of the birds in the British Museum, vol. 11, 1886, pp. 283-284.

⁷⁶ Biologia Centrali-Americana, Aves, vol. 1, Feb. 1884, pp. 326-327.

⁷⁷ U. S. Nat. Mus. Bull. 50, pt. 1, 1901, p. 661.

throat completely white, one female (No. 360407) with the throat white except for a slight ticking of brown in two or three feathers on the lower margin of the patch, and one male (No. 360404) with the brown suffusion covering the lower half of the patch with a brownish wash extending beyond. All others have the throat area deep brown. There are in addition in our collections two skins from Paso Nuevo near the Río San Juan, about 35 miles southeast of Tres Zapotes, that are typical *suffusus*. A skin from the same locality is found in the Museum of Comparative Zoölogy. One in the National Museum from Buena Vista, about 15 miles farther up the valley of the San Juan, has the throat white, as does another without certain locality that probably comes from near this same point. These two, with one from Frontera, Tabasco, are very slightly paler than *atriceps*, indicating intergradation toward the pale breasted *S. a. raptor* of the Yucatán Peninsula. The brown-throated *suffusus* seemingly is restricted to a region between Tres Zapotes and Paso Nuevo, extending for an undetermined distance toward Catemaco, and so occupies a very limited range that remains to be outlined fully. In the collection of P. W. Shufeldt I have seen five specimens of *atriceps* from La Buenaventura, Acayucan, Veracruz, of which four are typical *atriceps*, while one, a female, has the throat brown, of a paler shade than typical *suffusus*. It seems to represent an intermediate. In the collection of the Academy of Natural Sciences of Philadelphia there is one old specimen, No. 7816, with the brown throat of *suffusus*, a female without locality, from the Rivoli (Massena) collection presented by Dr. T. B. Wilson. We have one bird from Motzorongo that has a very slight suffusion of brown on the throat, the quantity being sufficient to be worth remark especially since this locality is near the area of the brown-throated birds.

In summary, in specimens throughout the range of *atriceps* occasional individuals show a little brown, usually in the lower margin of the throat patch. In the Tres Zapotes region this tendency becomes intensified to a point where the brown submerges the normal white color of the throat. The whole anterior part of the body tends to be more heavily pigmented also, since the black breast band averages heavier than in other sections. This latter character, however, is one subject to much individual variation.

These saltators were found spread through woodland as well as along the lines of trees and thickets that border the fields. While they live in heavy cover their presence is usually made known by their loud, strange calls. The usual note is an explosive *chuh chuh*, given with emphasis, and often followed by a loud warbling song of rough notes. If one can imagine the song of a Bell's vireo broadcast through an amplifier the effect can be understood. While found near the ground saltators ranged also through the tree tops.

They were noisy and conspicuous through March and early April, evidently the mating season, and then became more retiring. Sometimes during light fogs early in the morning I saw them resting in the tops of low trees over the trails, but more often noted them moving under cover in the thickets, or flying with bounding flight through the forest, the green back and black head showing conspicuously.

SALTATOR MAXIMUS GIGANTODES Cabanis

Saltator gigantodes CABANIS, Museum Heineanum, vol. 1, Oct. 1851, p. 142 (Mexico).

Our specimens were secured near Tres Zapotes on March 23 and 28, 1939, and January 17, and 20 and March 7, 1940. This was decidedly the rarest of the three kinds of saltators around Tres Zapotes. In general habits it suggested the larger *Saltator atriceps suffuscus*, but lived in heavier forest and kept more closely under cover. Most of the few that I saw were in leafy tree tops where they fed early in the morning. One came to sing in a low tree near the border of our camp clearing where I sat writing, the loud, slurred notes being entirely different from those of the other species, suggesting in part the song of a *Cyclarhis* and in part the notes of an oriole.

SALTATOR COERULESCENS GRANDIS (Lichtenstein)

Tanagra grandis LICHTENSTEIN, Preis-Verzeichniss mexicanischer Vögel, 1830, p. 2 (Jalapa, Veracruz).

Our specimens were taken at Tres Zapotes on March 14, 21, and 25, 1939, and January 25, and March 4, 5, and 8, 1940, and at Tlacotalpam, February 7, 9, 15, and 19, 1940. The species is one of wider general distribution than the other two as is shown by its occurrence in the scattered thickets about Tlacotalpam. Carriker noted it also among the dunes at El Conejo.

Near the Tres Zapotes camp these birds were common, being recorded daily, apparently occurring in greater number than *S. a. suffuscus*. They were found in the brush bordering old fields and were shy and retiring. In March and early in April I heard them singing a clear, loud warble suggestive of a grosbeak, with occasional ringing notes that bring to mind the ecstasies of the northern bobolink.

CARYOTHRAUSTES POLIOGASTER POLIOGASTER (Du Bus)

Pitylus polioaster DU BUS, Bull. Acad. Roy. Sci. Belgique, vol. 14, 1847, p. 105 (Guatemala).

Specimens were secured by Carriker at Tres Zapotes on February 23, and March 3 and 18, and on Cerro de Tuxtla on March 13, and

29, and May 8, 1940. This is a forest bird that ranges high in the trees.

RICHMONDENA CARDINALIS COCCINEA (Ridgway)

Cardinalis virginianus var. *coccineus* RIDGWAY, Amer. Journ. Sci., Jan., 1873, p. 39 (Mexico).

The cardinal is widely distributed through the shrubbery of old fields, along the borders of forest, and in more open woodland. Among our specimens are two from El Conejo, with a small series from Tres Zapotes, where it ranged into the foothills of the Sierra de Tuxtla. These cardinals, with all the usual mannerisms of this bird in the north, remained under cover in the main except when the males came out to sing in the tree tops, usually early in morning. The nesting period seemed under way by the middle of March, and males then were in full song. The notes resemble those of the northern bird but are given decidedly more slowly.

The bird of this area is definitely *coccinea*, with no evident approach to *littoralis* which has Puerto México (Coatzacoalcos) for its type locality.

HEDYMELES LUDOVICIANUS (Linnaeus): Rose-breasted Grosbeak

Loxia ludoviciana LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 306 (Louisiana).

On March 30, 1939, I saw one in the forest near Tres Zapotes.

GUIRACA CAERULEA INTERFUSA Dwight and Griscom: Western Blue Grosbeak

Guiraca caerulea interfusa DWIGHT and GRISCOM, Amer. Mus. Nov., No. 257, Mar. 14, 1927, p. 4 (Fort Lowell, Ariz.).

The single specimen is a male taken in the weeds of an old milpa at Tres Zapotes, March 21, 1939. This bird is molting around the forepart of the head. It is a little small, having the wing 86.8 mm., but has the brighter blue and the paler wing bands of *interfusa*.

CYANOCOMPSA PARELLINA PARELLINA (Bonaparte)

Cyanoloxia parellina BONAPARTE, Conspectus generum avium, vol. 1, 1850, p. 502 (Alvarado, Veracruz).

A female was taken by Carriker in heavy forest at about 1,000 feet elevation on the lower slopes of Cerro de Tuxtla, May 9, 1940.

CYANOCOMPSA CYANOIDES CONCRETA (Du Bus)

Cyanoloxia concreta DU BUS, Bull. Acad. Roy. Belgique, vol. 22, 1885, p. 150 (Playa Vicente, Veracruz).

Our specimens were taken at Tres Zapotes, March 16, 1939, and January 26 and March 26, 1940. One comes from about 1,000 feet

elevation on Cerro de Tuxtla, March 29. They were found in heavy undergrowth in forest, sometimes coming out to feed in fairly open growth.

PASSERINA CYANEA (Linnaeus): Indigo Bunting

Tanagra cyanea LINNAEUS, *Systema naturae*, ed. 12, vol. 1, 1766, p. 315 (South Carolina).

In 1939 I recorded males on March 22 and 25 and April 5, 6, and 10, taking a bird in full plumage on April 10. One shot and destroyed on April 6 was molting. Carriker secured the first one in 1940 on March 25 and another on the following day. Until the middle of April he recorded them frequently. Apparently they winter elsewhere, at least in any considerable number.

PASSERINA CIRIS CIRIS (Linnaeus). Eastern Painted Bunting

Emberiza Ciris LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 179 (South Carolina).

An adult male was taken at Tres Zapotes by Carriker on March 4, 1940. The bird was found in a brushy locality.

PASSERINA CIRIS PALLIDIOR Mearns: Western Painted Bunting

Passerina ciris pallidior MEARNS, *Proc. Biol. Soc. Washington*, vol. 24, Oct. 31, 1911, p. 217 (Fort Clark, Kinney County, Tex.).

Our skins include a male taken April 6, 1939, and two females January 23, 1940. The two females are well-marked examples of the western race, characterized by paler coloration and slightly larger size. The male is slightly intermediate but is nearer *pallidior*. The species is rare in this vicinity.

There is no reason to consider that the western race of the painted bunting is migrant only to western Mexico. The two forms are mingled in their winter quarters.

TIARIS OLIVACEA PUSILLA Swainson

Tiaris pusillus SWAINSON, *Phil. Mag.*, June 1827, p. 438 (Temascáltepec and Real del Monte).

Our seven specimens were taken near Tres Zapotes on March 28, 1939, and March 25 and April 11, 1940, and on the lower slopes of Cerro de Tuxtla May 6, 9, and 10, 1940. The species was scarce across the level areas but was more common in the rolling country from Cerro Chico Zapote across to the mountains.

SPOROPHILA TORQUEOLA MORELLETI (Bonaparte)

Spermophila morelleti BONAPARTE, *Conspectus generum avium*, vol. 1, 1850, p. 497 (Petén, Guatemala).

This is one of the common species of the region, represented by a small series. The birds were found in pastures and the borders of cultivation, often in company with *Volatinia jacarina atronitens*. As I passed they flew into the cover of low weeds or thickets and immediately were gone. Though I saw them daily, they are birds easily overlooked because of these retiring habits and their small size. At the beginning of April they were nesting, and I heard them singing a pleasant warbling song. Carriker found them in the Tuxtla range as high up as clearings had been made.

It seems reasonable to place this form as a race of *Sporophila torqueola*.

ORYZOBORUS FUNEREUS Sclater

Oryzoborus funereus P. L. SCLATER, *Proc. Zool. Soc. London*, 1859 (Feb. 1860), p. 378 (Suchapam, Oaxaca).

Carriker shot a male January 25, 1940, in a clump of bushes growing in a marshy spot in the savanna near camp, our only record.

VOLATINIA JACARINA ATRONITENS Todd

Volatinia jacarini atronitens TODD, *Proc. Biol. Soc. Washington*, vol. 33, Dec. 30, 1920, p. 72 (Campeche, Campeche).

At Tres Zapotes these little birds were common in groups sometimes containing 25 or 30 individuals that ranged through weeds and grassy growth in the fields and little clearings. When startled they flew rapidly into the adjacent thickets and there slipped away so quickly that it was seldom that I flushed one a second time. At camp they came out into the edge of the clearing to feed, moving quickly and nervously and occasionally flitting the wings. They are found across the level lowlands, being common to the base of the mountains. In 1939 I saw them in flocks until my departure on April 15, though males were coming into breeding dress at the end of March. Specimens were taken on March 7, 15, 22, 23, and 24 and April 8, 1939, and March 4, 1940.

ATLAPETES APERTUS Wetmore

Atlapetes apertus WETMORE, *Proc. Biol. Soc. Washington*, vol. 55, Aug. 13, 1942, p. 108 (Cerro de Tuxtla, Sierra de Tuxtla, Veracruz, Mexico).

Carriker secured five specimens of this fine bird on Cerro de Tuxtla on March 19 and on Volcán San Martín on April 16 and 17, 1940. They were found in the forests to the summit of the mountains, from about 2,500 feet upward, sometimes in pairs that ranged on the ground around rotting logs and fallen trees. Usually they were

rather shy. They seemed to be more common on San Martín than on the neighboring peak of Tuxtla.

This is one of the most remarkable of the discoveries that have come from the careful exploration of the Sierra de Tuxtla and one that offers an especially interesting problem for consideration in connection with Dr. Chapman's detailed and enlightening study of the characters of this group written 20 years ago.⁷⁸

Briefly, *Atlapetes brunnei-nucha brunnei-nucha* has an extended range in the subtropical zone from central Veracruz south through mountainous areas to southern Perú (with a closely allied subspecies *xanthogenys* in the mountains from Caracas to Mérida in Venezuela). The birds from the sections just outlined are marked by a distinct black band across the breast. In the subtropical zone of western Ecuador, in the mountains drained by the Chimbo and Chanchan Rivers, there is found a closely allied form, *Atlapetes inornatus*, without the black breast band but on the dorsal surface closely similar to the ordinary type. And now in southeastern Veracruz we have *Atlapetes apertus*, quite like *brunnei-nucha* above but also lacking the black band across the breast. We have then a widely ranging group of birds, living under definitely restricted zonal conditions, with plain-breasted representatives in isolated areas near either end of the vast range in which the band-breasted type is encountered.

The three forms are generally similar in pattern and style of coloration, being marked by a combination of brown and black in the crown. They differ, however, appreciably from one another as the following will indicate:

Atlapetes brunnei-nucha (Lafresnaye): A black band across the chest, brown of pileum extending back on to the hindneck, bordered laterally by a line of golden brown. (The subspecies *xanthogenys* differs from the typical form only by having a longer, more slender bill, and a whiter under surface.)

Atlapetes inornatus (Scater and Salvin): Breast without a black band, under surface more extensively white; brown of crown extending back only to back of head, not reaching the hind neck (but bordered as in *brunnei-nucha* by a line of golden-brown).

Atlapetes apertus Wetmore: Breast without black band, brown of pileum extending to hindneck with no lateral line of golden-brown.

From this it may be supposed that in *inornatus* and *apertus* we have the descendants of an ancient species from which the band-breasted *brunnei-nucha* has evolved and become dominant to spread until it has swamped out the parent stock. Of this parent stock we find now two isolated remnants, one in Veracruz and one in Ecuador. Dr. Chapman has suggested the interesting possibility of an origin

⁷⁸ Chapman, F. M., Mutation among birds in the genus *Buarremon*. Bull. Amer. Mus. Nat. Hist., vol. 48, Oct. 15, 1923, pp. 243-278, figs. 1-3, pls. 14-17.

for *Atlapetes brunnei-nucha* from *Pipilo torquatus* found now through the southern part of the tableland of Mexico, a species that is closely similar in color pattern. In its large strong feet, with long hind claw, as well as in its strong, conical bill, proportionately longer tail, and much more robust form, *Pipilo torquatus*, however, is quite distinct from any *Atlapetes*, agreeing wholly in its characters with other species of *Pipilo*. It would appear therefore that the interesting similarity in color pattern is due to a parallel development and not to actual relationship. If we combine the colors and patterns of *Oberholseria*, which also is a towhee, and *Pipilo*, then we can understand more easily what is found in *Pipilo torquatus*. I may add that the keel of the sternum in *Atlapetes brunnei-nucha* is low and the pectoral muscles weak. I do not at present have a skeleton of *Pipilo torquatus*, but in its allies the sternal keel is high and rounded and the breast muscles strong. Equivalent differences appear in the skulls.

The three birds *brunnei-nucha*, *inornatus*, and *apertus* obviously belong to the same group. Specimens of *inornatus* are recorded with spots of black on the sides of the breast, and in *brunnei-nucha* there is variation in the width of the black breast band (though some of this supposed variation may be due partly to the preparation of the skin), but in the reduced amount of brown on the crown *inornatus* is distinct. *Atlapetes apertus*, on the other hand, appears to have no indication of bridging characters. For the present I prefer to consider the three as separate species until more is known of them.

Curiously enough, *apertus* below is almost identical in color with *virenticeps*, which is in the group of *Atlapetes* with green crown streaked laterally with black.

In connection with *apertus* I have found a most interesting statement by Berlepsch and Taczanowski,⁷⁹ who in writing of *inornatus* of Ecuador state that "le Musée de Varsovie possède un oiseau acquis de feu Verreaux, nommé par Jules Verreaux *B. brunneinuchus*, et étiquetté comme provenant du Mexique, semblable en tout à notre oiseau de l'Ecuadeur, sans aucune trace de collier noir, mais qui s'en distingue par le brun du sommet de la tête plus sombre et sans bordure latérale, plus claire et plus vive, semblables à celle du *B. brunneinuchus*; l'olive du dos plus sombre sans aucune trace de vert jaunâtre sur le nuque." The description is obviously that of a specimen of *apertus*, as the dark color of the crown without the light lateral line and the unbanded breast are characteristic of that bird. This is especially noteworthy since it indicates that one of Verreaux's collectors secured at least one specimen in the Sierra de Tuxtla at an early date. This must be the supposition unless *apertus* is found elsewhere, which it hardly seems will be the case.

⁷⁹ Proc. Zool. Soc. London, 1884, p. 292.

ARREMONOPS RUFIVIRGATUS CRASSIROSTRIS (Ridgway)

Embernagra rufivirgata β *crassirostris* RIDGWAY, Proc. U. S. Nat. Mus., vol. 1, 1878, p. 248 (Mexico).

We obtained a good series of this common resident bird in the lowlands as well as several from the lower slopes of the Sierra de Tuxtla. It is an inhabitant of thickets and undergrowth, not of heavy forest, so that in the overgrown, abandoned fields common in this area it finds extensive areas suitable to its needs. We noted it also in underbrush at the borders of forest, and in such growth commonly found along the cultivated fields. On the mountain slopes it ascended with the clearing of the land for planting. In habits it is quiet, remaining usually under cover and moving about slowly near the ground so that it is easily overlooked. The song, given from a low perch under shelter of leaves, is simple repetition of a single note that at the end becomes a trill.

PASSERCULUS SANDWICHENSIS SAVANNA (Wilson): Eastern Savannah Sparrow

Fringilla Savanna WILSON, American ornithology, vol. 3, 1811, p. 55, pl. 22, fig. 3 (Savannah, Ga.).

In February 1940 Carriker found these sparrows common in marshy grass near ponds and lagoons near Tlacotalpam, taking a pair on February 8. He shot a male at El Conejo on February 12. Probably other forms occur here also.

AMMODRAMUS SAVANNARUM PRATENSIS (Vieillot): Eastern Grasshopper Sparrow

Passerina pratensis VIEILLOT, Nouv. Dict. Hist. Nat., vol. 25, 1817 (Dec. 1818), p. 24 (New York).

On February 12, 1940, Carriker shot a female at El Conejo on an open grass-grown slope in the sand dunes near the sea. One other was seen:

CHONDESTES GRAMMACUS STRIGATUS Swainson: Western Lark Sparrow

Chondestes strigatus SWAINSON, Phil. Mag., June 1827, p. 435 (Temascáltepec, Tableland of Mexico).

On February 10, 1940, at El Conejo, Carriker found a small flock and shot two, male and female. They were wild and difficult to approach. On subsequent trips here they were not found.

MELOSPIZA LINCOLNII LINCOLNII (Audubon): Lincoln's Sparrow

Fringilla Lincolnii AUDUBON, Birds of America (folio), vol. 2, 1834, pl. 193 (near the mouth of the Natashquan River, Quebec).

This is a common winter resident, our small series including specimens from Tres Zapotes taken on March 8, 18, and 30, and April

3, and 13, 1939, and January 23, 1940; from Tlacotalpam, February 5, 1940; and from El Conejo, February 12, 1940. On their wintering grounds these sparrows seem completely at home, and here in Mexico I was able to appreciate fully the statements of E. A. Preble that this species is the song sparrow of the far north. Since boyhood I have been familiar with Lincoln's sparrow as a migrant, and in eastern Kansas in fall I have seen many hundreds of them, but at Tres Zapotes in less than two months I actually learned more of their mannerisms than in 35 years of previous observation. Here instead of being shy skulkers that never left the dense shelter of weeds and shrubbery, their habit in migration, they came out like song sparrows to feed around the borders of the little clearing that we had made about our camp. At any time of the day if all was peaceful I had only to raise my eyes to see one or two feeding quietly on the ground, sometimes only 15 feet away. They pecked steadily at the earth, often scratching in typical finch fashion by jumping forward and then back, dragging the forward claws on the earth on the return, and then feeding again in the soil disturbed by this action. Others remained under the thin screen of leaves of the bordering shrubbery, and sometimes I found them running along on the earth in the protecting shelter of cornfields. When alarmed they retreated instantly to cover, where sometimes I heard them scolding sharply, the notes being suggestive of those of the swamp sparrow. I saw one driving petulantly at a little blue-black grassquit (*Volatinia jacarina atronitens*) that came too near. At dusk sometimes several came down from a weed grown field back of camp to roost in or near dense clumps of bushes. The daily appearance of this bird is to me one of the many pleasant memories of my work in this interesting locality.

On March 30 there was sudden increase in their number, evidence of migration from farther south, as on that morning half a dozen came skipping about on the ground in our clearing. They were passing in increased numbers through the early days in April and were still present on April 15, when I left for return home.

After examination of considerable material it appears to me that the present species can be separated into two races, *lincolni* and *gracilis*, but that the additional form named by Miller and McCabe from the mountain area of the Rocky Mountains of the United States and other western mountains⁸⁰ cannot be separated successfully from *lincolni*. Some specimens from this area have very slightly longer wings and tails than specimens from the east and north, but others

⁸⁰ *Melospiza lincolni alticola* A. H. Miller and T. T. McCabe, Condor, 1935, p. 156 (Bluff Lake, San Bernardino Mountains, San Bernardino County, Calif.).

are no larger. There results a slight average difference in series, leaving a number that can be placed with either group. Color differences are not discernible except to note that there is considerable individual variation.

There are two females from Tres Zapotes, taken on March 18 and April 13, and one from Tlacotalpam shot on February 5, with wing measurements of 61.9, 62.2, and 63 mm., that on the criteria set up by Miller and McCabe could be placed with their *alticola*. The other specimens coincide with the *lincolnii* of these authors. I prefer to call all *lincolnii*.

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NEW GENERA AND SPECIES OF BARK BEETLES OF THE SUBFAMILY MICRACINAE (SCOLYTIDAE, COLEOPTERA)

By M. W. BLACKMAN

IN a series of three earlier papers¹ the writer revised the bark beetles of the subfamily Micracinae of the United States, described 4 new genera and subgenera and 25 new species, and presented keys to the genera and species. In the present paper 2 new genera and 16 new species are described. Of these 1 genus and 11 species are from continental United States, while 1 new genus and 5 new species are from the West Indies, Colombia, and Mexico.

The subfamily Micracinae is a rather small one containing relatively few known genera, and with the exception of *Hylocurus* Eichhoff no genus contains more than 10 known species. Specimens of Micracinae are usually not numerous in collections. This is due in part to their small size and to the inconspicuous work of representatives of such genera as *Pseudothysanoes* Blackman, *Cryptocleptes* Blackman, and the new genus from the continental United States described in this paper, which breed in the bark of dying or dead twigs of hickory, oak, acacia, and other deciduous trees and shrubs, and in other cases to the very secluded life of such lignivorous forms as *Hylocurus* Eichhoff, *Micracis* LeConte, *Micracisella* Blackman,

¹ Mississippi Agr. Exp. Stat. Techn. Bull. 9, pp. 1-62, 1920; New York State Coll. Forestry Techn. Publ. 16, pp. 142-148, 1922; New York State Coll. Forestry Techn. Publ. 25, pp. 185-208, 1928.

and *Thysanoes* LeConte, which live most of their life deep in the wood of their hosts.

In so far as known, all species breed in the bark or wood of deciduous trees or shrubs. Trees that are decadent, dying, or recently dead and broken or cut limbs and twigs commonly serve as breeding places. Large colonies of brood burrows are seldom found together, as is so often the case with other scolytids, although with *Hylocurus langstoni* (Blackman) such a massed attack is not uncommon. In most cases, however, only single burrows or small groups of burrows are found at one place. This is probably due to the paucity of individuals of most of the species, especially of the lignivorous forms such as various species of *Hylocurus*, *Micracis*, and *Thysanoes*.

The proper development of the brood of such forms depends upon whether the wood infested is in proper condition for the nourishment of the larvae. This appears to involve the presence of sufficient moisture and the presence of the hyphae of rapidly developing fungi. If the wood dries too rapidly, fungi do not develop properly and the larvae die either from lack of moisture or from the resultant slowing up of the development of decay fungi. Whether it is lack of water, lack of fungal hyphae, or lack of material produced by fungal decay that is responsible for the death of the larvae cannot be definitely stated. Perhaps the presence of all three is essential. It may well be significant that in hickory, which is a favored host for a number of species, decay of the sapwood is extremely rapid if sufficient moisture and warmth are present.

As regards economic importance the various genera and species of Micracinae vary considerably. None of the forms breeding in bark are known to be strongly injurious, as they choose as hosts decadent or broken limbs or twigs. Such species, while they may occasionally kill limbs that might otherwise survive, may in general be classed as mildly beneficial in that they aid in the processes of decay and thus hasten the return of such material to the soil.

Species of the lignivorous genera *Hylocurus*, *Micracis*, and *Thysanoes* are potentially more injurious and in several cases are known to be actually injurious. For example, *Hylocurus langstoni* (Blackman), common in the Southeastern States, often attacks living trees through injured or deadened areas of the bark, breeds in the wood beneath such areas, and by feeding on the adjacent living bark extends the injury until the entire tree is killed. Posts and poles set in the soil before being thoroughly seasoned are also often subject to heavy attack, resulting in a type of injury similar to that made by powder-post beetles, by which the entire sapwood is often riddled by larval mines filled with powdery frass.

KEY TO THE GENERA OF MICRACINAE

1. Antennal club with distinct sutures on outer face; antennal scape clavate or flattened, widened and subtriangular, funicle with 6 segments----- 2
Antennal club without distinct sutures on outer face; antennal scape clavate or slightly flattened, funicle typically with 6 segments but variously modified and occasionally with fewer----- 7
2. Posterior end of elytra drawn out to form an acuminate sutural apex----- 3
Posterior end of elytra conjointly rounded----- 5
3. Antennal scape club shaped, with a few short or moderate hairs, club with first suture broadly curved; eyes short oval, widely separated above and beneath; fore tibia slightly wider distally, with both edges sinuate, distal end with 2-5 submarginal teeth----- *Hylocurus* Eichhoff
Antennal scape flattened, subtriangular, with numerous long hairs, club with first suture angulate or narrowly curved; eyes large, elongate, more coarsely granulate, contiguous, narrowly or moderately separated beneath; fore tibia with outer margin nearly straight----- 4
4. Eyes moderately separated beneath, their inner margins entire; fore tibia with 5 teeth, all on distal submargin, terminal mucro broad----- *Micracis* LeConte
Eyes contiguous or narrowly separated beneath, their inner outlines emarginate; fore tibia with 5 teeth, at least one of which is on outer submargin, terminal mucro slender----- *Micracisella* Blackman
5. Antenna with scape crudely club shaped, not twisted, with long hairs, club strongly flattened, sutures marked by setal rows of short hairs; fore tibia similar to that of *Micracis*, with sides nearly straight and subparallel, with mucro wide and shorter; elytral declivity not sulcate----- 6
Antennal scape twisted clavate with fewer long hairs, club moderately flattened, sutures marked by rows of long hairs and by strong annulations; fore tibia somewhat similar to that of *Hylocurus*, wider distally with sides sinuate, mucro long, rather slender; elytral declivity sulcate----- *Stenoclyptus*, new genus
6. Pronotum longer than wide, widest near middle, with sides weakly arcuate, subparallel, summit not high, posterior area horizontal; fore tibia wide, with distal end squarely or obliquely truncate, terminal mucro entire----- *Thysanoes* LeConte
Pronotum wider than long, widest near base, its outline subsemicircular or subtriangular, summit high, posterior area sloping; fore tibia narrower, distal end obliquely truncate, terminal mucro sometimes bifurcate----- *Pseudothysanoes* Blackman
7. Antennae of male and female similar, funicle slightly longer than the short ovate club----- *Cryptocleptes* Blackman
Antennae of male of the normal micracine type; that of female with funicle more than twice as long as club or scape, club elongate-securiform in female----- *Chalcohyus*, new genus

Genus *HYLOCURUS* Eichhoff

Hylocurus EICHHOFF, Berlin Ent. Zeitschr., vol. 15, pp. 133-134, 1871; Ratio Tomicinorum, Mém. Soc. Roy. Sci. Liège, ser. 2, vol. 8, pp. 298-301, 1878.—BLANDFORD, Biologia Centrali-Americana, Insecta-Coleoptera, vol. 4, pt. 6, pp. 220-225, 1898.—BLACKMAN, New York State Coll. Forestry Techn. Publ. 16, pp. 142-148, 1922; Techn. Publ. 25, pp. 186, 192, 1928.—SCHIDL, Rev. Ent., vol. 10, p. 723, 1939.

Micra's LECONTE (in part), LECONTE, Proc. Amer. Phil. Soc., vol. 15, pp. 368-369, 1876.—SWAINE, Canada Dept. Agr., Ent. Branch, Bull. 14, pt. 2, p. 83, 1918.—BLACKMAN, Mississippi Agr. Exp. Stat. Techn. Bull. 9, pp. 19-27, 1920.

Genotype.—*Hylocurus elegans* Eichhoff. (Monobasic.)

The genus *Hylocurus* Eichhoff contains more species than any of the other genera of Micracinae. Of these, 12 have been described from the Neotropics and 11 species are found in continental United States. Several of the species are known only from one sex, and the secondary sexual differences vary so greatly in different species groups that in some cases we cannot be certain of the sex without dissection. This is not desirable when a species is represented by a single specimen.

Blandford believed that in the males the elytral interspaces "become subcarinate as they approach the declivity, round which they form a marginal series of teeth, carinae, or in one species, acute spines" and the sides of the elytra may appear to diverge behind. "In the female the elytra are regularly and strongly declivitous behind, . . . with no marginal tubercles." This may be true of all the species he treated, as it is of such northern species as *parkinsoniae* Blackman, and *quadrispinosus* Blackman and to a lesser degree of *langstoni* (Blackman), but it is not true of *rudis* (LeConte), *biorbis* (Blackman), *bicornus* (Blackman), *harnedi* (Blackman), *spalix* Blackman, and *schwarzi* Blackman. In these latter species the most readily seen secondary sexual differences have to do with frontal characters or with differences in the number, size, and arrangement of tubercles on the face of the declivity.

It would then appear that a key to the entire genus cannot be perfected until specimens of both sexes of all the species are available. Until such time we must rely on Blandford's key to the Neotropical forms and on the existing keys for the more northern species. The three new species described herewith can be readily fitted into the latter key (Blackman, 1928, *loc. cit.*).

HYLOCURUS BICONCAVUS, new species

PLATE 29, FIGURE 1

Very dark reddish brown, the pronotum subopaque, elytra shining; 2.22 mm. long, 2.82 times as long as wide; related to *rudis* (LeConte), *biorbis* (Blackman), and *bicornus* (Blackman).

Frons with a large, deep ovate concavity at each side of the median line, extending dorsad from slightly above the epistoma, more than half the long diameter being above the upper border of the eye, surfaces of concavities opaque, reticulate, apparently devoid of true punctures and hairs; with a thick, high, median carina, completely separating the two concavities and extending anteriorly to form the normal contour of the head, its surface opaque and reticulate; side between concavity and eye finely aciculate. Eye small, short oval, remotely separated above and below, inner margin entire, the facets fine. Antenna of the *rudis* type, club short oval, with first two sutures distinct, sinuate.

Pronotum 1.16 times as long as wide, widest in middle third, posterior outline weakly arcuate, posterior angles rounded; sides subparallel on posterior two-thirds, very broadly rounded in front, anterior margin not truly serrate; anterior area with rather numerous broad, low asperities, summit low; posterior area granulate-punctate, interstices reticulate; pubescence apparently lacking on posterior area, inconspicuous on asperate area.

Elytra very slightly wider than pronotum and 1.50 times as long, 1.69 times as long as wide; sides subparallel on anterior three-fourths, strongly rounded posterolaterally, with a prominent sutural apex; surface moderately shining; striae weakly impressed, very closely, rather coarsely punctured; interspaces narrow, very sparsely and finely punctured, becoming granulate posteriorly, with a few very small, inconspicuous hairs. Declivity convex, rather steep, coarsely granulate; suture not elevated; third, fifth, seventh, and ninth interspaces more elevated, with coarse granules or small tubercles; with an indefinite elevation at each side in third interspace in upper half of declivity; sutural apex prominent, densely granulate, its sides meeting at an angle of about 90 degrees.

The specimen here described is probably a male. No female has been seen.

Type locality.—Kentucky.

Host.—Unknown.

Type material.—Holotype, U. S. N. M. No. 56399.

The holotype bears the data "Ky., No. 33, Solt." (Soltan collection).

HYLOCURUS FLAGLERENSIS, new species

PLATE 29, FIGURE 2

Female.—Dark reddish brown, with summit of pronotum red; 2.37 mm. long, 2.59 times as long as wide; related to *lungstoni* (Blackman) and *quadrispinosus* Blackman.

Frons convex above, subopaque, reticulate, strongly granulate, with a nearly straight, transverse carina at upper level of eyes, shining, continuous near median line, but more or less broken up into granules

toward sides; area below carina transversely impressed, feebly shining, finely granulate, reticulate; hairs short, fine and very inconspicuous except on epistomal margin; devoid of coarser bristles such as in *langstoni* and *quadrispinosus*. Eye small, short oval, inner margin entire, facets fine. Antenna of the usual *Hylocurus* type, with short, twisted scape bearing a few moderate hairs, much longer 6-segmented funicle and short oval club with two strongly setigerous sutures, the first sinuate-arcuate, the second bisinuate.

Pronotum 1.13 times as long as wide, widest near base, posterior outline arcuate, posterior angles strongly rounded; sides subparallel on posterior half, moderately broadly rounded in front, with anterior margin weakly serrate; anterior area with numerous low, wide asperities; summit moderately high; with a broad, moderately deep, transverse impression behind it; posterior area opaque to subopaque, granulate-punctate, interstices distinctly reticulate; hairs inconspicuous except in transverse impression.

Elytra slightly wider than pronotum and 1.37 times as long, 1.5 times as long as wide; sides subparallel on anterior two-thirds, broadly rounded at posterior angles, with a prominent sutural apex; surface moderately shining, strongly sculptured; striae strongly impressed on disk, less impressed on sides, punctures coarse, deep, closely placed, becoming deeper and larger posteriorly, often with fine hairs; interspaces moderately narrow, strongly rugose, becoming granulate-tuberculate posteriorly, punctures small, numerous, each bearing a stout, erect bristle, becoming longer and stouter toward declivity and on sides. Declivity rather steep but rounded above and at sides; suture flat, first and second striae nearly lacking, with punctures obsolescent; third, fifth, seventh, and ninth interspaces elevated and more strongly granulate; face of declivity with small to moderately large conical teeth as follows on each elytron: A small one near summit opposite first stria, a row of three (sometimes two) in third interspace, the uppermost small, the others progressively larger, a rather small one in seventh interspace, and a row of several small and one large tooth on ninth interspace; sutural apex prominent, densely, moderately finely granulate, its sides making an angle of 90 degrees; vestiture abundant, consisting of small hairs from striae and coarse bristles from interspaces, more numerous and conspicuous than on disk.

The male is unknown.

This species resembles *langstoni* in size and general proportions but differs in many respects. It can immediately be distinguished by the abundant elytral vestiture and by the absence of conspicuous vestiture on the frons as well as by numerous structural differences. There is a greater similarity between this species and *quadrispinosus*, but the latter is much smaller, is less rugged in sculpture, and also has rather conspicuous frontal vestiture.

Type locality.—Florida.

Host.—Unknown.

Type material.—Holotype and one paratype, U.S.N.M. No. 56400.

Described from two specimens, both obtained from traps in the Florida fruit-fly survey, the holotype from Flagler County, Fla., by D. G. Webb, March 1, 1933, the paratype from Marion County, Fla., by R. B. Mathews, January 24, 1935.

HYLOCURUS CRINITUS, new species

PLATE 29, FIGURES 3, 4

Female.—Dark reddish brown, hairy, rather shining, 2.52 mm. long, 2.89 times as long as wide; very distinct from any other North American form but moderately closely allied to *schwarzi* Blackman.

Frons convex above, subopaque, finely granulate-punctate, feebly, transversely impressed below, finely granulate and subopaque at sides, finely punctate and shining in median area; hairs of moderate length, rather sparse. Eye short oval, inner margin entire, facets moderate. Antenna (pl. 29, fig. 3) with 6-segmented funicle, 1.3 times as long as club; club long oval, 1.58 times as long as wide, first two sutures strongly indicated by sinuate rows of setae.

Pronotum 1.07 times as long as wide, widest on posterior third, posterior outline nearly straight, posterior angles slightly rounded; sides subparallel behind, feebly constricted anterior to middle, moderately broadly rounded in front, anterior margin with 10 distinct serrations; anterior area with numerous irregularly arranged asperities, with numerous moderate hairs; summit moderately high; posterior area subopaque to weakly shining; granulate-punctate, interstices reticulate, impressed at each side just behind summit; vestiture of rather sparse, short hairs on most of disk, much longer and more numerous in the two lateral impressions; sides more roughly punctate-granulate.

Elytra slightly wider than pronotum and 1.76 times as long, 1.80 times as long as wide; sides nearly straight and subparallel on anterior three-fourths, strongly rounded posterolaterally, with a broad, rather short, sutural acumination; surface rather brightly shining; striae impressed, punctures large and close, but rather shallow, with fine, short hairs; interspaces narrow, rugose-granulate, finely punctured, with erect hairs longer than on striae, becoming slightly coarser, more abundant, and much longer posteriorly. Declivity rather steeply arched, coarsely, ruggedly punctured; all interspaces more or less granulate; third and ninth interspaces elevated, with coarser granules; all of interspaces bearing numerous rather long, conspicuous, moderately coarse hairs; sutural apex prominent, granulate, its sides meeting at an angle of more than 90°.

Fore tibia (pl. 29, fig. 4) of the usual *Hylocurus* structure, widened distally, both sides sinuate, terminal mucro strong, its end recurved; distal end oblique, with five submarginal teeth.

The male is unknown.

Type locality.—Orange County, Calif.

Hosts.—*Rhus lourina* Nuttall and *R. integrifolia* (Nuttall) B. and H.

Type material.—Holotype and five paratypes, U. S. N. M. No. 56401. The type series was collected October 24, 1934, by W. Ebeling, from the two species of *Rhus* cited above.

Genus MICRACIS LeConte

Micracis LECONTE, Trans. Amer. Ent. Soc., vol. 2, pp. 164-165, 1868; Proc. Amer. Phil. Soc., vol. 15, pp. 367-368, 1876.—EICHHOFF, Ratio Tomnicorum, Mém. Soc. Roy. Sci. Liège, ser. 2, vol. 8, pp. 302-304, 1878.—SWAINE, Canada Dept. Agr., Ent. Branch, Bull. 14, pt. 2, p. 83, 1918.—BLACKMAN, Mississippi Agr. Exp. Stat. Techn. Bull. 9, pp. 8-35, 1920; New York State Coll. Forestry Techn. Publ. 25, pp. 192-197, 1928.

Genotype.—*Micracis suturalis* LeConte.

The genus *Micracis* in the restricted sense used in this paper contains 10 valid species as follows: *suturalis* LeConte (synonym *aculeatus* LeConte), *hirtellus* LeConte, *acutipennis* Eichhoff, *meridianus* Blackman, *populi* Swaine, *swaini* Blackman, *cubensis* Blackman, *lignator* Blackman, *dimorphus* Schedl, and *knulli*, new species, described below. Of these *acutipennis* and *dimorphus* occur in Brazil and *cubensis* is from Cuba, while the other seven species occur in continental United States.

MICRACIS KNULLI, new species

PLATE 29, FIGURES 5, 6

Female.—Dark reddish brown; 2.59 mm. long, 3.19 times as long as wide; allied to *lignator* Blackman but much smaller.

Frons convex above, with surface hidden by numerous moderately long, stout, spatulate bristles, sordid yellow in color and directed dorsad; lower frons somewhat flattened between eyes, the middle third bare, subopaque, distinctly reticulate, without punctures, lateral third densely covered by yellow hairs, finer and longer than those above. Eye long oval, moderately separated beneath, moderately coarsely granulate, with inner margin slightly sinuate. Antenna (pl. 29, fig. 5) testaceous, scape flattened, moderately strongly dilated distally, and ornamented by long, fine hairs; club flattened, with narrowly arcuate sutures, about 1.64 times as long as wide.

Pronotum 1.16 times as long as wide, slightly widest near middle, posterior outline feebly arcuate, posterior angles rounded; sides nearly

straight and subparallel behind middle, feebly constricted before middle, moderately broadly rounded in front, with anterior margin rather strongly serrate; summit moderate, with a distinct, broad, transverse impression behind it; anterior area with numerous moderate asperities, and many short, coarse, clavate or spatulate bristles; posterior area shining on disk, with small, moderately spaced punctures, bearing fine, short hairs or somewhat longer, coarser bristles, surface in impression not so shining, granulate-punctate and distinctly reticulate, with many coarser bristles; sides granulate-punctate.

Elytra slightly wider than pronotum and 1.97 times as long, 2.22 times as long as wide; sides subparallel on anterior three-fourths, then gradually narrowed and extended to sutural apex; surface shining, indistinctly reticulate; punctures in definite stria rows, only the first stria distinctly, the others slightly or not at all impressed on anterior disk, all striae impressed toward declivity; interspaces narrow, very finely punctured and bearing both short, fine hairs and longer, spatulate bristles. Declivity convex, summit and sides rounded, striae narrower and more strongly impressed than on disk, punctures smaller and closer; interspaces wider, suture and second interspace scarcely elevated, not granulate, third interspace elevated and granulate, all lateral interspaces more or less granulate, the fifth, seventh, and ninth more strongly than others; all interspaces with numerous conspicuous, suberect, spatulate bristles, some of them, especially on third and fifth interspaces, much longer, with ends tapering but still flattened.

Fore tibia (pl. 29, fig. 6) of usual type with sides subparallel, outer edge entire, terminal mucro large and slightly hooked; distal end obliquely truncate, with five submarginal teeth.

Male.—Similar in general habitus to female, but smaller (2.4 mm. long) and slightly stouter (3.03 times as long as wide); frons with uniform, short, stout, erect bristles throughout; antenna with scape not so broadly dilated distally, and with fewer, shorter hairs; vestiture more abundant on pronotum and elytra, with bristles more strongly spatulate and often scalelike.

Type locality.—Huachuca Mountains, Ariz.

Host.—Unknown.

Type material.—Holotype, allotype, and eight paratypes, U.S.N.M. No. 56402.

The holotype was taken September 9, 1938, in the Huachuca Mountains, Ariz., by D. J. and J. N. Knull; allotype and eight paratypes bear the data "Huachuca Mts., Arizona, VII-1-07, Miller Canyon, H. A. Kaeber."

Genus *MICRACISELLA* Blackman

Micracisella BLACKMAN, New York State Coll. Forestry Techn. Publ. 25, pp. 192, 196-197, 1928.

Pseudomicracis BLACKMAN (not Eggers), Mississippi Agr. Exp. Stat. Techn. Bull. 9, p. 20, 1920.

Genotype.—*Micracis nanula* LeConte.

In 1920 the writer recognized that the species *Micracis nanula* LeConte and *M. opacicollis* LeConte differed from *M. suturalis* LeConte and its allies in several important particulars. He therefore separated it under the subgeneric name *Pseudomicracis*. Later it was found that Eggers earlier in the year had used this same name as the generic designation of a group of African scolytids. Therefore, in 1928 the new name *Micracisella* Blackman was substituted for *Pseudomicracis* Blackman. It is now considered that the differences between the *suturalis* and *nanula* groups are so important as to necessitate the raising of *Micracisella* to full generic rank.

Generic description.—Body cylindrical, with ends of elytra extended into an acuminate apex as in *Micracis*; color reddish brown to black, with fine hairs and spatulate bristles or scales; antenna with scape flattened and somewhat extended laterally, with long hairs in female, club-shaped in male (as in *Hylocurus*), funicle 6-segmented; club shorter than in *Micracis*; eye very large, contiguous or narrowly separated in gular region, inner line emarginate, facets coarse; fore tibia slightly wider distally, with outer margin nearly straight, inner margin sinuate; submarginal, socketed teeth usually five in number, with one or two on outer margin, terminal mucro rather slender, curved.

Other species of *Micracisella* are *Micracis opacicollis* LeConte (synonym *Micracis asperulus* LeConte), *Micracis opacithorax* Schedl from Mexico, and *subnitida*, new species, here described.

MICRACISELLA SUBNITIDA, new species

PLATE 29, FIGURES 7, 8

Male.—Dark reddish brown, with anterior half of pronotum and elytral declivity lighter; 1.83 mm. long, 3.14 times as long as wide; allied to *opacicollis* (LeConte) and *nanula* (LeConte).

Frons convex above, subopaque, finely granulate-punctate above and at sides, with rather sparse, flattened, scalelike hairs; median area below impressed, shining, with only a few very fine punctures; epistomal hairs slender, directed orad. Eye large, long oval, narrowly separated below, inner line emarginate, facets rather coarse. Antenna (pl. 29, fig. 7) with scape club-shaped, with only a few long hairs, slightly shorter than club, distinctly shorter than funicle; club ovate, 1.27 times as long as wide, with arcuate sutures.

Pronotum 1.08 times as long as wide, widest near base, posterior margin weakly arcuate, posterior angles distinctly rounded; sides subparallel on posterior half, slightly constricted in front of middle, rather broadly rounded in front, anterior margin with only a few low serrations; anterior area lighter in color, asperities rather numerous, of moderate size, with moderate hairs; summit slightly anterior to middle, rather low; posterior area dark reddish brown, weakly shining, reticulate, sparsely punctate-granulate, with short, flattened, scalelike, cinereous hairs directed toward summit.

Elytra equal in width to pronotum, and 1.92 times as long, 2.07 times as long as wide; sides subparallel on anterior four-fifths, narrowly rounded behind, with a short sutural apex; surface moderately shining; stria punctures small, shallow, in regular subimpressed, stria rows; interspaces narrow, rugulose, finely punctate-granulate, each with a row of short, scale-like hairs, less numerous and more slender than in *opacicollis*. Declivity convex, striae impressed, interspaces, except second, convex, granulate, with spatulate hairs, slightly longer but no more numerous than on disk; sutural apex small and inconspicuous.

Fore tibia (fig. 8) of same type as in *opacicollis*.

The female is unknown.

Type locality.—Santa Rita Mountains, Ariz.

Host.—Unknown.

Type Material.—Holotype, U. S. N. M. No. 56403.

Described from a single specimen collected by H. F. Wickham.

Genus THYSANOES LeConte

Thysanoes LECONTE, Proc. Amer. Phil. Soc., vol. 15, p. 369, 1876.—LECONTE and HORN, Smithsonian Misc. Coll., vol. 26, No. 507, pp. 519-520, 1883.—SWAINE, Canada Dept. Agr., Ent. Branch, Bull. 14, pt. 2, p. 82, 1918.—BLACKMAN, Mississippi Agr. Exp. Stat. Techn. Bull. 9, pp. 36-45, 1920; New York State Coll. Forestry Techn. Publ. 25, pp. 197-199, 1928.

Genotype.—*Thysanoes fimbricornis* LeConte. (Monobasic.)

Aside from the genotype, three species have been described, *berchemiae* Blackman and *lobdelli* Blackman from the southeastern United States, and *xylophagus* Blackman from Arizona and New Mexico. In the present paper three new species are described, two from Texas and one from Mexico.

KEY TO THE SPECIES OF THYSANOES LECONTE

- | | |
|---|---|
| 1. Larger, females 1.71-2.0 mm. long----- | 2 |
| Smaller, females 1.39-1.55 mm. long----- | 5 |
| 2. Mature color yellowish brown; frons with a small pit or fovea at center; punctures of elytra finer; antennal club narrow, first segment about one-third its entire length----- | |
| fimbriicornis LeConte | |

- Mature color dark brown to black; frons without central pit; punctures of elytra moderate to coarse; antennal club broader, first segment less than one-third its entire length----- 3
3. Frons in female longitudinally sulcate below; summit of pronotum concolorous, asperities finer; fore tibia with distal end oblique----- *berchemiae* Blackman
- Frons in female not sulcate below; summit of pronotum much lighter in color, asperities coarser----- 4
4. Frons longitudinally carinate above; pronotum distinctly longer than wide; elytral punctures not so coarse; body smaller and more slender; southeastern United States----- *lobdelli* Blackman
- Frons not carinate above; pronotum not notably longer than wide; elytral punctures rather coarse; body larger and stouter; Arizona, New Mexico----- *xylophagus* Blackman
5. Body slender, 3.0 times as long as wide; frons with short, broad, cinereous scales; pronotum distinctly longer than wide; elytra moderately rounded behind----- *texanus*, new species
- Body moderately stout, less than 2.7 times as long as wide; frons with short, fine hairs; pronotum scarcely longer than wide----- 6
6. Pronotal vestiture of spatulate setae; elytra with stria punctures smaller and closer, interspaces narrower; declivital vestiture nearly uniform----- *vachelliae*, new species
- Pronotal vestiture shorter, broader, more scalelike; elytral punctures coarser, not so close, interspaces wider, more rugose; declivital vestiture notably longer on third interspace_ *retamae*, new species

THYSANOE TEXANUS, new species

PLATE 30, FIGURE 13

Female.—Reddish brown with elytra darker; 1.55 mm. long, nearly exactly 3.00 times as long as wide.

Frons concave from eye to eye, rather sharply margined at sides, surface shining, reticulate, with fine punctures bearing short, broad, cinereous scales, easily abraded. Eye very large, broad ovate, inner margin entire, facets coarse. Antennal scape (pl. 30, fig. 13) longer than club or funicle; club 1.74 times as long as wide, with two distinct, setose sutures, first arcuate, second more strongly arcuate.

Pronotum 1.16 times as long as wide, widest near middle, posterior outline feebly arcuate, posterior angles scarcely rounded; sides very feebly arcuate from base to faint constriction anterior to middle, broadly rounded in front, with anterior margin not regularly serrate; anterior area with broad, low asperities and short, stout, cinereous bristles; summit moderate, slightly in front of middle; posterior area horizontal, its surface subopaque, distinctly reticulate, with rather sparse, very fine and shallow punctures and short, rather fine bristles on disk, somewhat longer on sides.

Elytra equal in width to pronotum and 1.67 times as long, 1.85 times as long as wide; sides subparallel on more than basal three-fourths, moderately broadly rounded behind; stria punctures deep, close, of

moderate size, in regular stria rows, only first stria impressed on disk and sides; interspaces narrow, rugulose, with sparse, fine punctures on disk; vestiture of very fine, very short hairs from stria punctures and a few short, moderately fine, erect, spatulate setae from interspaces. Declivity convex; striae impressed, punctures finer than on disk, each with small, inconspicuous hair; interspaces slightly convex, bearing short, erect, broadly spatulate, scalelike hairs, much more numerous and more conspicuous than on disk.

The male is unknown.

Type locality.—Brownsville, Tex.

Host.—Unknown.

Type material.—Holotype and one paratype, U.S.N.M. No. 56404.

THYSANOES VACHELLIAE, new species

PLATE 30, FIGURES 11, 12

Female.—Light reddish brown, with anterior pronotum and elytral declivity distinctly darker; holotype 1.41 mm. long, 2.69 times as long as wide.

Frons concave from eye to eye, moderately sharply margined at sides, surface brightly shining, reticulate, very finely punctured, with very fine, short, inconspicuous hairs. Eye very large, broad-oval, facets coarse, inner margin entire. Antenna (pl. 30, fig. 11) with club slightly shorter than funicle, scape longer than either; club 1.36 times as long as wide, with distinct, arcuate, setose sutures.

Pronotum 1.02 times as long as wide, widest near middle, posterior outline feebly arcuate, posterior angles scarcely rounded; sides arcuate from base to distinct constriction anterior to middle, very broadly rounded in front, with anterior margin not serrate; anterior area with sparse, rather low, small asperities and short, stout, spatulate bristles; summit moderate, in front of middle; posterior area horizontal, its surface subopaque, finely, distinctly reticulate, punctures sparse, fine and very shallow, with shorter, smaller, more slender bristles than on anterior area.

Elytra equal in width to pronotum and 1.69 times as long, 1.78 times as long as wide; sides subparallel on more than basal two-thirds, broadly rounded behind; stria punctures in nearly regular rows, deep, close, moderately coarse, first stria weakly impressed, others not impressed; interspaces narrow, rugulose, punctures small, bearing short, stout bristles, longer and more spatulate posteriorly. Declivity steeply arched, convex; striae impressed, punctures smaller than on disk; interspaces somewhat convex, with punctures bearing moderately short, erect, spatulate bristles, more numerous, longer, and more conspicuous than on disk.

Fore tibia (pl. 30, fig. 12) with sides entire, nearly straight and subparallel, terminal mucro long and stout, curved; distal end with three submarginal, socketed teeth.

Male.—Somewhat shorter (1.34 mm. long) and stouter (2.61 times as long as wide); frons transversely impressed below; anterior margin of pronotum distinctly serrate, anterior area more strongly asperate; vestiture of elytral declivity more broadly spatulate, scalelike, that on third interspaces longer than on others.

Type locality.—Brownsville, Tex.

Host.—*Vachellia farnesiana* (L.) W. and A.

Type material.—Holotype, allotype, and nine paratypes, U.S.N.M. No. 56405.

The type series was reared by H. S. Barber in 1904 from limbs of *Vachellia farnesiana* pruned by *Oncideres* sp.

THYSANOES RETAMAE, new species

PLATE 30, FIGURE 14

Female.—Reddish brown, with posterior half of pronotum lighter; 1.41 mm. long, 2.57 times as long as wide.

Frons strongly concave between eyes, distinctly margined, with a few rather short hairs directed dorsad, and with a few finer, longer hairs directed orad from the epistoma. Eye moderately broad, oval, inner margin entire, facets rather coarse. Antenna (pl. 30, fig. 14) with club and scape subequal in length, funicle somewhat shorter, scape rudely club shaped, with a sparse fringe of rather long hairs; funicle 6-segmented, with pedicel more than one-third of total length, distal segments progressively wider; club 1.45 times as long as wide, sutures all setose, and all arcuate.

Pronotum almost exactly as wide as long, widest slightly behind middle, posterior outline weakly arcuate, posterior angles scarcely rounded; sides arcuate from base to distinct constriction anterior to middle, very broadly rounded in front, anterior margin not serrate; anterior area with sparse, broad, low asperities, and short, stout, scalelike setae; summit moderate, very near middle; posterior area horizontal, surface subopaque, finely reticulate, with fine, shallow punctures bearing short, spatulate setae.

Elytra very slightly narrower than pronotum and 1.61 times as long, 1.67 times as long as wide; sides subparallel on anterior two-thirds, rather broadly rounded behind; surface shining, roughly punctured; stria punctures, deep, rather large, in regular rows, only the first stria impressed; interspaces narrow, rugose, with fine punctures bearing short, erect, scalelike or spatulate setae, longer and coarser posteriorly. Declivity steeply arched, convex, with stria punctures deep but slightly smaller than on disk; interspaces narrow, rugose, with numerous con-

spicuous, spatulate setae, longer and wider than on disk, those on third interspace notably longer than others near apex.

The male is unknown.

Type locality.—Mexico.

Host.—"Retama wood."

Type material.—Holotype and one paratype, U.S.N.M. No. 56406.

The holotype and paratype were intercepted at quarantine in "Retama wood," June 29, 1938.

Genus PSEUDOTHYSANOES Blackman

Pseudothysanoes BLACKMAN, Mississippi Agr. Exp. Stat., Techn. Bull. 9, pp. 46-50,

1920; New York State Coll. Forestry Techn. Publ. 25, pp. 199-207, 1928.

Cryphalus LECONTE (in part), Proc. Amer. Phil. Soc., vol. 15, p. 362, 1876.

Thysanoes LECONTE, Swaine (in part), Canada Dept. Agr., Ent. Branch, Bull. 14, pt. 2, p. 82, 1918.

Genotype.—*Pseudothysanoes drakei* Blackman.

Other specials are *Pseudothysanoes* (synonym *Cryphalus*) *rigidus* (LeConte) and *lecontei* Blackman from the eastern States, *hopkinsi* Blackman from California, and *phoradendri* Blackman, *sedulus* Blackman, *gambetti* Blackman and *barberi* Blackman from the southwestern United States. To these is added *P. huachucae*, new species from southern Arizona, described below.

PSEUDOTHYSANOES HUACHUCAE, new species

PLATE 30, FIGURE 15

Male.—Reddish brown; 1.21 mm. long, 2.44 times as long as wide; allied to *hopkinsi* but differing in several respects.

Frons convex above, strongly, transversely flattened below, shining, strongly, roughly punctured, with short, stout, scalelike hairs; epistomal margin with longer, slender hairs extending orad and partly concealing mandibles. Eye broadly oval, inner margin entire, facets small. Antenna (pl. 30, fig. 15) with scape longer than either club or funicle, slightly club shaped with scanty fringe of long hairs, club shorter than funicle, 1.25 times as long as wide, sutures indicated by setal rows, first slightly bisinuate, second nearly transverse.

Pronotum very slightly wider than long, subtriangular in shape, widest near base, posterior outline weakly arcuate, posterior angles rounded; sides convergently arcuate, weakly constricted anterior to middle, narrowly rounded in front, subangulate medially, with several small serrations; summit lighter in color, high, slightly behind center: anterior area with subconcentric rows of small asperities and short, stout setae not extending to middle at sides; posterior area sloping toward base, feebly shining, reticulate, finely, indistinctly punctured on disk and sides, appearing glabrous but with a few very fine, inconspicuous hairs.

Elytra slightly wider than pronotum and 1.54 times as long, 1.47 times as long as wide; sides subparallel on basal two-thirds, rather narrowly rounded behind, subangulate at apex, with a broad, shallow emargination at suture, as seen from behind, exposing tip of abdomen; surface moderately shining, irregularly, indistinctly reticulate; striae punctures deep, close, rather coarse, in regular feebly impressed rows; interspaces moderately narrow, slightly convex, rugulose, with a few fine punctures; vestiture of minute, scarcely visible hairs from striae punctures and short, moderately stout setae from interspaces, becoming longer and spatulate posteriorly on disk and sides. Declivity sloping, originating slightly behind middle, with no special modifications except that the setae of interspaces are longer, and spatulate, and the striae punctures are very small and more shallow, with striae rows not impressed.

Female.—Larger and more slender, 1.43 mm. long, 2.69 times as long as wide; frons weakly concave from eye to eye, finely, roughly punctured; pronotum broadly rounded in front, margin without serrations; elytra with setae of interspaces short, spatulate, nearly uniform throughout.

Type locality.—Huachuca Mountains, Ariz.

Host.—Unknown.

Type material.—Holotype, allotype, and eight paratypes, U.S.N.M. No. 56407.

The type series was collected by H. A. Kaeber, June 25, 1907.

STENOCLYPTUS, new genus

Genotype.—*Stenoclyptus rhois*, new species, here described.

Body form subcylindrical; frons flattened and with conspicuous vestiture; eye short oval with inner margin entire; antenna of typical micracine structure, with twisted, club-shaped scape, bearing numerous long hairs; funicle of six segments and club with annulated sutures notched at sides and marked by lines of setae; pronotum with summit postcentral, asperities rather coarse and sparse, confined to an oval area, the sides being without asperities; elytra subtruncate behind, declivity bisulcate; fore coxae separated; fore tibia slightly widened distally and with sides sinuate as in *Ilylocurus* Eichhoff, but with long terminal mucro and two or three large submarginal teeth; tarsus with third segment slender.

This new genus bears a deceptive, superficial resemblance to *Cactopinus* Schwarz, but is only very remotely related.

STENOCLYPTUS RHOIS, new species

PLATE 29, FIGURES 9, 10

Female.—Dark piceous, nearly black; 1.39 mm. long, 2.50 times as long as wide.

Frons convex above, flattened between eyes, surface shining, finely, rather closely punctured, with moderately long, conspicuous, cinereous hairs, directed dorsad. Eye short ovate, with inner line entire; facets rather fine. Antenna (pl. 29, fig. 9) with scape club shaped, its shaft strongly curved and twisted, with moderately abundant, long hairs; funicle 1.21 times as long as either scape or club, with six segments, pedicel more than one-third of entire length, distal segments not greatly widened; club 1.7 times as long as wide, sutures weakly arcuate, indicated by strong setal rows and annulations, with distinct notches at sides.

Pronotum almost exactly as wide as long, widest on posterior half, posterior outline weakly arcuate, posterior angles rounded, sides weakly arcuate to beyond middle, scarcely constricted in front of middle, moderately narrowly rounded in front, anterior margin without serrations but with two submarginal asperities extending beyond margin; summit high, distinctly behind middle, lighter in color; anterior area rather coarsely but sparsely asperate on a limited ovate area, with inconspicuous hairs interspersed, sides of anterior half devoid of asperities, shining, reticulate, finely, rather sparsely punctured, with longer, slender hairs; posterior area shining, distinctly reticulate, with rather large punctures, closely placed near summit, but progressively sparser laterally, hairs short and inconspicuous on disk, longer at sides.

Elytra slightly wider than pronotum and 1.81 times as long, 1.61 times as long as wide; sides subparallel on more than anterior three-fourths, very broadly rounded, subtruncate behind; surface shining, indistinctly reticulate, roughly sculptured; stria punctures moderately coarse, rough, shallow, in fairly definite rows, only the first impressed and it rather weakly; interspaces rugose, with fine punctures bearing short, inconspicuous hairs, longer at sides. Declivity steep, suture elevated, especially posteriorly, with a moderate sulcus at each side, lateral convexities rather high; entire declivity subshining, distinctly reticulate, rugose, stria punctures smaller than on disk, interspaces with a few fine hairs of moderate length. Venter of thorax and abdomen with rather long, slender hairs.

Fore tibia (pl. 29, fig. 10) somewhat wider distally, sides sinuate, mucro rather long and slender, curved, distal end diagonally truncate, with two submarginal teeth.

The male is unknown.

Type locality.—Orange, Calif.

Host.—*Rhus integrifolia* (Nuttall) B. and H.

Type material.—Holotype and one paratype, U.S.N.M. No. 56408.

The type series was collected October 24, 1934, by W. Ebeling.

STENOCLYPTUS CEANOETHI, new species

Female.—Piceous-black, subopaque; 1.68 mm. long, 2.68 times as long as wide; similar to *rhois* in habitus but with finer surface structures more or less hidden by an incrustation.

Frons convex above, weakly concave between eyes, finely, closely punctured, with rather coarse, moderately long hairs directed dorsad on most of surface, directed orad from epistoma so as to veil the mandibles. Eye rather small, short ovate, inner line entire, facets moderately small. Antenna very similar to that of *rhois*, but with hairs of scape more abundant and longer.

Pronotum about as long as wide, widest one-third of distance from base, posterior outline nearly straight, posterior angles strongly rounded; sides strongly arcuate from base to rather narrowly rounded anterior margin, which bears two strong serrations; summit high, lighter in color, distinctly behind middle; anterior area coarsely, rather sparsely asperate on an ovate area, with hairs coarser and more conspicuous than in *rhois*; sides and posterior disk subopaque or feebly shining, reticulate, with small, shallow punctures (often concealed by incrustation), hairs coarser than in *rhois*, short and inconspicuous except on posterior margin and in impression behind summit.

Elytra slightly wider than pronotum and 1.76 times as long, 1.68 times as long as wide; sides subparallel on anterior three-fourths, very broadly, subtruncately rounded behind; surface opaque owing to an apparent incrustation which conceals most of the strial punctures; first stria feebly impressed, only near declivity, the others not impressed; interspaces with surface concealed by incrustation, but indicated by rows of short, fine hairs, longer and thicker at sides and behind. Declivity rather steep, suture elevated, more strongly posteriorly, with a sulcus at each side, lateral convexities rather high; higher than suture above, surface incrustated in type but one paratype showing surface subshining, finely rugosely punctate; hairs rather sparse, stouter than in *rhois*.

Fore tibia with sides sinuate, subparallel as in *Hylocurus*, outer edge not serrate, terminal mucro long, somewhat curved, distal end oblique and armed with three submarginal teeth.

The male is unknown.

Type locality.—Yosemite National Park, Calif.

Host.—*Ceanothus integerrimus* H. and A.

Type material.—Holotype and three paratypes, U.S.N.M. No. 56409.

The type series was collected February 28, 1934, from *Ceanothus integerrimus*, by D. DeLeon.

Genus CRYPTOCLEPTES Blackman

Cryptocleptes BLACKMAN, Mississippi Agr. Exp. Stat. Techn. Bull. 9, p. 51, 1920:
New York State Coll. Forestry Techn. Publ. 25, pp. 207-208, 1928.

Genotype.—*Cryptocleptes dislocatus* Blackman.

Previously known species are two in number, *C. dislocatus* Blackman from the southeastern part of the United States and *minor* Blackman from Cuba. In the present paper four new species are described, one from Texas, one from Cuba, and two from Colombia.

KEY TO THE SPECIES OF CRYPTOCLEPTES BLACKMAN

1. Antennal scape in female longer than funicle and with abundant, very long hairs; Cuba----- *insularis*, new species
Antennal scape in female subequal to or shorter than funicle, hairs less abundant and moderately long----- 2
2. Pronotum much wider than long and very broadly rounded in front in both sexes; head visible from above; Cuba----- *minor* Blackman
Pronotum little wider than long in female, distinctly wider in male, less broadly rounded in front; head concealed from above in both sexes----- 3
3. Antenna with one or more funicular segments obsolescent (pl. 30, fig. 21); Colombia, South America, in *Albizia malacocarpa* Standley----- *murilloi*, new species
Antenna with funicular segments normal (pl. 30, fig. 22)----- 4
4. Male stouter, 2.24 times as long as wide; antennal club subglobose; female unknown; Colombia, South America----- *columbianus*, new species
Male more slender, 2.36-2.84 times as long as wide; antennal club ovate or obovate; females 2.70-2.84 times as long as wide; Southern States----- 5
5. Larger, 1.3 mm. long; frons strongly concave, with fovea at center; antennal club ovate; setae of elytral declivity coarser and longer; southeastern United States, in *Hicoria* spp.---- *dislocatus* Blackman
Smaller, 1.06 mm. long; frons moderately concave, without central fovea; antennal club obovate; setae of elytral declivity shorter and finer; Texas, in *Acacia berlandieri* Benth.-- *acaciae*, new species

CRYPTOCLEPTES INSULARIS, new species

PLATE 30, FIGURES 16, 17

Female.—Light reddish brown; 1.26 mm. long, 2.44 times as long as wide.

Frons concave nearly from eye to eye, distinctly margined at sides; surface of concavity shining, finely punctured; with fine, short, inconspicuous hairs, much longer on epistoma and directed orad so as to conceal mandibles. Eye broad-oval, with inner line entire; facets

moderately large. Antenna (pl. 30, fig. 16) with scape club shaped, slightly flattened, longer than either funicle or club, ornamented with a rather dense brush of long, light-colored hairs, which veil frons when antennae are extended; funicle 6-segmented, with pedicel more than half as long as five distal segments together; club slightly shorter than funicle, about 1.39 times as long as wide, sutures incompletely outlined by setae.

Pronotum only slightly wider than long, widest near base, posterior outline nearly straight, posterior angles rounded; sides weakly arcuate behind, feebly constricted in front of middle, anterior margin moderately broad, weakly serrate; anterior area rather sparsely and weakly asperate, with moderately fine and short hairs; summit moderate; posterior area horizontal, surface shining, distinctly reticulate, with sparse, shallow, fine punctures, subglabrous.

Elytra as wide as pronotum and 1.65 times as long, 1.55 times as long as wide; sides subparallel on more than basal two-thirds, with ends meeting to form a shallow emargination at suture, exposing tip of abdomen; surface moderately shining; stria punctures strong, in definite, regular, not impressed rows, bearing minute hairs; interspaces of moderate width, rugulose and finely punctured on disk near suture, becoming finely, uniseriately granulate behind, hairs moderately short, rather stout; sides with stria punctures not so deep; interspaces smoother, hairs less numerous. Declivity convex, stria punctures as on disk, first stria impressed; interspaces uniseriately, finely granulate, with short, erect, spatulate setae.

Male.—Shorter and stouter than female, 1.09 mm. long, 2.23 times as long as wide; frons transversely impressed below, surface subopaque, reticulate, with fine punctures and fine, inconspicuous hairs; pronotum with anterior margin bearing five serrations, asperities stronger; elytra with spatulate setae longer at summit of declivity and on third to sixth interspaces.

Type locality.—Cayamas, Cuba.

Host.—Unknown.

Type material.—Holotype and allotype, U.S.N.M. No. 56410.

The type series was collected by E. A. Schwarz.

CRYPTOCLEPTES MURILLOI, new species

PLATE 30, FIGURE 21

Female.—Very dark reddish brown; 1.19 mm. long, 2.91 times as long as wide.

Frons broadly concave between eyes, with a small, shallow pit at center, surface moderately shining, reticulate, finely punctured, with fine, short, inconspicuous hairs. Eye short oval, inner line entire,

facets moderately small. Antenna (pl. 30, fig. 21) with scape and funicle subequal in length, and club shorter; scape flattened, widened distally, fringed with long, fine hairs; funicle with pedicel nearly as long as distal portion, of which the five segments are irregular in size, the third and fifth funicular segments apparently obsolescent; club broad ovate, only slightly longer than wide, sutures imperfect.

Pronotum 1.06 times as long as wide, widest behind, posterior outline weakly arcuate, posterior angles scarcely rounded; sides straight and subparallel on posterior half, distinctly but weakly constricted in front of middle, very broadly rounded in front, anterior margin not serrate; anterior area with moderate asperities and erect, spatulate setae; summit slightly anterior to middle, rather high, lighter in color; posterior area shining, reticulate, punctures very shallow, rather sparse; subglabrous.

Elytra equal in width to pronotum and 1.80 times as long, 1.91 times as long as wide; sides subparallel on anterior three-fourths, narrowly rounded behind, with ends meeting to form a broad, shallow emargination at suture as seen from behind, exposing tip of abdomen; surface moderately shining, feebly reticulate; strial punctures small, rather shallow, in regular rows, striae except the first one not impressed; interspaces of moderate width, finely rugulose, punctures very fine, rather sparse on disk and sides, with a few short inconspicuous hairs. Declivity convex, strial punctures fine, not so shallow as on disk, with minute hairs, first stria impressed; interspaces with fine punctures and short, erect, spatulate setae.

Male.—Considerably shorter (1.05 mm. long) and stouter (2.66 times as long as wide); frons convex above, transversely flattened below, surface shining; pronotum more strongly sculptured with anterior margin distinctly serrate; elytra with strial punctures larger, vestiture more conspicuous.

Type locality.—Colombia, South America.

Host.—*Albizzia malacocarpa* Standley.

Type materials.—Holotype, allotype, and 18 paratypes, U.S.N.M. No. 56411.

Holotype, allotype, and 10 paratypes bear the labels "San Vicente, Sant. Colombia, L. M. Murillo 157, Calopo, June, '35, 692 m. alt., 27° C."; 8 paratypes, "On branch *Albizzia malacocarpa*, Dpt. Santander, Colombia, S. A., 700-1300 m., R. P. Roba, Numbers C. H. and B. U."

CRYPTOCLEPTES COLOMBIANUS, new species

PLATE 30, FIGURE 18

Male.—Reddish brown, with summit of pronotum lighter; 0.99 mm. long, 2.24 times as long as wide; allied to *murilloi*, new species, but shorter and much stouter.

Frons nearly flat from eye to eye, with a small, shallow pit at center; surface shining, reticulate, finely punctured, vestiture abraded. Eye short oval, inner line entire, facets small. Antenna (pl. 30, fig. 18) with club and scape subequal in length, funicle shorter; scape rudely club-shaped with a few rather short hairs; club 1.31 times as long as wide, with sutures imperfectly outlined by sparse setae.

Pronotum 1.11 times as wide as long, widest near base, posterior outline nearly straight, posterior angles slightly rounded; sides weakly arcuate from base to anterior constriction, moderately rounded in front, with six rather weak serrations; anterior area with rather small, sparse asperities, and a few inconspicuous setae; summit moderate, at about middle; posterior area horizontal, surface feebly shining, reticulate, with a few fine, shallow punctures and a few inconspicuous hairs.

Elytra slightly wider than pronotum and 1.54 times as long, 1.37 times as long as wide; sides subparallel on slightly more than basal half, narrowly rounded behind; surface fairly shining; striae regular, impressed posteriorly, punctures small; interspaces reticulate, rugulose, punctures fine, setae short, inconspicuous. Declivity sloping, originating midway of elytra; striae impressed and punctures as on disk; interspaces slightly convex, each with a row of conspicuous, cinereous, erect, broadly spatulate setae or scales.

The female is unknown.

Type locality.—San Vicente, Colombia, South America.

Host.—Unknown.

Holotype.—U.S.N.M. No. 56412.

The holotype bears the label "San Vicente, Santander, Colombia; L. M. Murillo, Calapo, June, '35, 692 m. alt., 27° C."

CRYPTOCLEPTES ACACIAE, new species

PLATE 30, FIGURES 19, 20

Female.—Reddish brown, with basal half of pronotum lighter; 1.06 mm. long, 2.74 times as long as wide.

Frons moderately concave between eyes, finely, closely punctured above and at sides, with fine, moderately short, cinereous hairs extending orad, median half of concavity shining, scarcely punctate, with many scanty, short, fine, inconspicuous hairs. Eye broad oval, inner margin entire, facets rather small. Antenna (pl. 30, fig. 19) with club obovate, 1.28 times as long as wide, 0.70 as long as funicle, sutures arcuate, with incomplete setal rows.

Pronotum 1.04 times as long as wide, widest near base, posterior outline faintly arcuate, posterior angles rounded; sides arcuate on posterior half, distinctly constricted in front of middle, very broadly

rounded in front, anterior margin not serrate; anterior area with broad, low asperities and short, stout, spatulate setae; summit moderately high, at middle; posterior area nearly horizontal, surface shining, reticulate, sparsely, shallowly, finely punctured, with short, fine hairs.

Elytra equal in width to pronotum and 1.86 times as long, 1.79 times as long as wide; sides subparallel well behind middle, narrowly rounded behind; surface subshining, faintly reticulate; striae punctures in regular, not impressed rows; interspaces narrow, with very fine uniseriate punctures, each bearing a fine, erect hair. Declivity convex, striae punctures slightly smaller than on disk, each bearing a minute hair; interspaces with much finer punctures bearing short, erect, narrowly clavate setae, much more conspicuous than on disk.

Male.—Shorter than female and considerably stouter, 0.97 mm. long, 2.43 times as long as wide; frons convex above, transversely flattened below, surface subopaque, reticulate, finely punctured; pronotum with anterior margin distinctly serrate; elytral vestiture coarser and more abundant, especially on declivity.

This species is rather closely allied to *Cryptocleptes dislocatus* Blackman but is slightly stouter, with elytra more narrowly rounded behind and declivital vestiture not so coarse, and the detailed structure of frons, antenna, etc., shows considerable differences.

Type locality.—Brownsville, Tex.

Host.—*Acacia berlandieri* Benth.

Type material.—Holotype, allotype, and 44 paratypes, U.S.N.M. No. 56413.

The type series was reared from the limbs of *Acacia berlandieri* collected at Brownsville, Tex., August 1904, by H. S. Barber.

CHALCOHYUS, new genus

Genotype.—*Chalcohyus securigerus*, new species.

Resembling certain species of *Cryptocleptes* in habitus but stouter; head concealed from above, frons flattened, weakly concave in female; antennal club securiform, with distal end pointed, sutures obscure; funicle 6-segmented, segments not widened distally, loose jointed, as long as or longer than club and scape together in female, not so excessively long in male; fore coxae nearly contiguous, fore tibia (fig. 22) slightly narrower distally, distal end very obliquely truncate with three submarginal teeth, mucro thick, flattened, recurved and notched at end; pronotum and elytra somewhat similar to those of *Thysanocis* in sculpture and vestiture.

CHALCOHYUS SECURIGERUS, new species

PLATE 30, FIGURES 22, 23, 24

Female.—Light to dark reddish brown; 1.25 mm. to 1.68 mm. long, holotype 1.60 mm. long, 2.55 times as long as wide; anterior end of pronotum and posterior ends of elytra darker.

Frons moderately concave from eye to eye and from epistoma to well above upper border of eye, surface shining throughout, brilliantly shining and impunctate below in median third, finely, rather closely punctured at sides and above, hairs short and inconspicuous over most of punctured area, with a thin fringe of very long yellow hairs extending from above nearly to epistomal margin and partly veiling surface; epistomal margin at each side with a dense brush of long yellow hairs arising just above base of mandible and extending ventromesad, concealing all but the tip of the mandible. Eye small, short oval, inner line entire, facets moderately small. Antenna (pl. 30, fig. 24) nearly half as long as body, the club and distal joint of funicle extending beyond posterior border of pronotum; scape less than one-fourth as long as entire antenna, testaceous, somewhat widened distally, with only a few short hairs; funicle of six long, loose-jointed segments, of which the pedicel is testaceous and nearly half as long as the scape, distal segments piceous-brown, more slender, of nearly uniform diameter, and subequal in length except the last; club piceous, longer than scape, little more than half as long as funicle, hatchet shaped or lance shaped, arrangement of setae showing little evidence of sutural rows.

Pronotum 1.05 times as wide as long, widest at base, posterior border nearly straight, posterior angles scarcely rounded; sides feebly, arcuately converging on posterior half, feebly constricted in front of middle, broadly rounded in front, anterior margin not serrate; anterior area with moderate-sized asperities and short, stout bristles; summit moderately high; posterior area nearly horizontal, shining, reticulate, finely, not closely punctured, with fine granules just behind summit; vestiture of short, fine hairs on disk, longer and coarser near summit.

Elytra slightly wider than pronotum and 1.66 times as long, 1.57 times as long as wide; sides subparallel on anterior three-fourths, moderately rounded behind; surface moderately shining, indistinctly reticulate; finely punctured in regular rows, only first stria row impressed; interspaces finely rugulose, very finely punctured, with rather short, fine, erect bristles, scarcely visible except in profile. Declivity convex, much darker in color, striae punctured as on disk, with a few minute hairs; interspaces more closely punctured, with rather short, erect spatulate, scalelike bristles in double rows on first three interspaces.

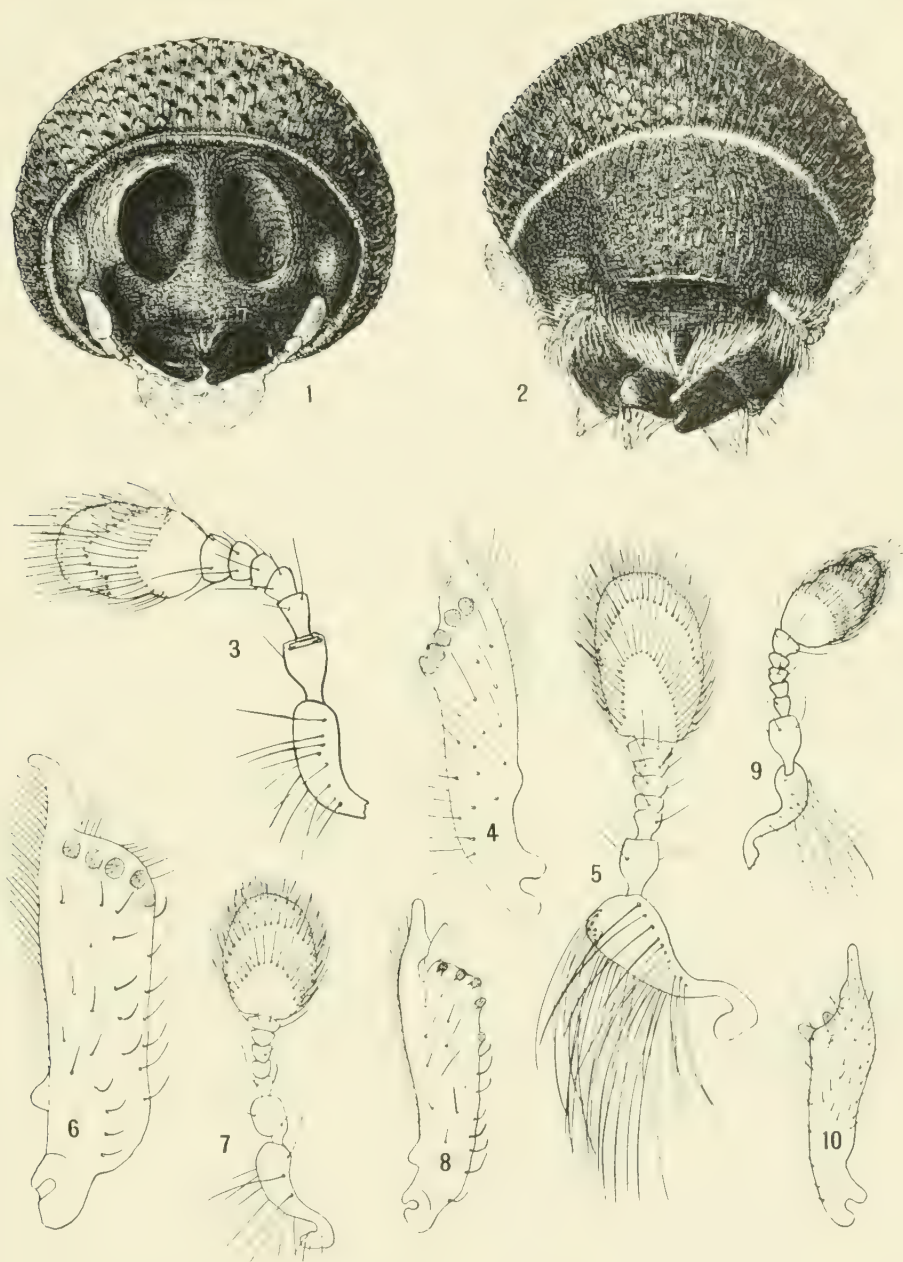
Male.—Considerably shorter and stouter than female, 1.35 mm. long, 2.15 times as long as wide; frons finely granulate-punctate, convex above, subopaque, transversely impressed below, more shining, more finely punctured, hairs short and inconspicuous; antenna (pl. 30, fig. 23) superficially different from that of female, but essentially similar, except that the funicle is more nearly of the usual type and little longer than the scape; pronotum with anterior margin serrate; elytra about as wide as in female but much stouter, 1.27 times as long as wide.

Type locality.—Puerto Rico and Haiti.

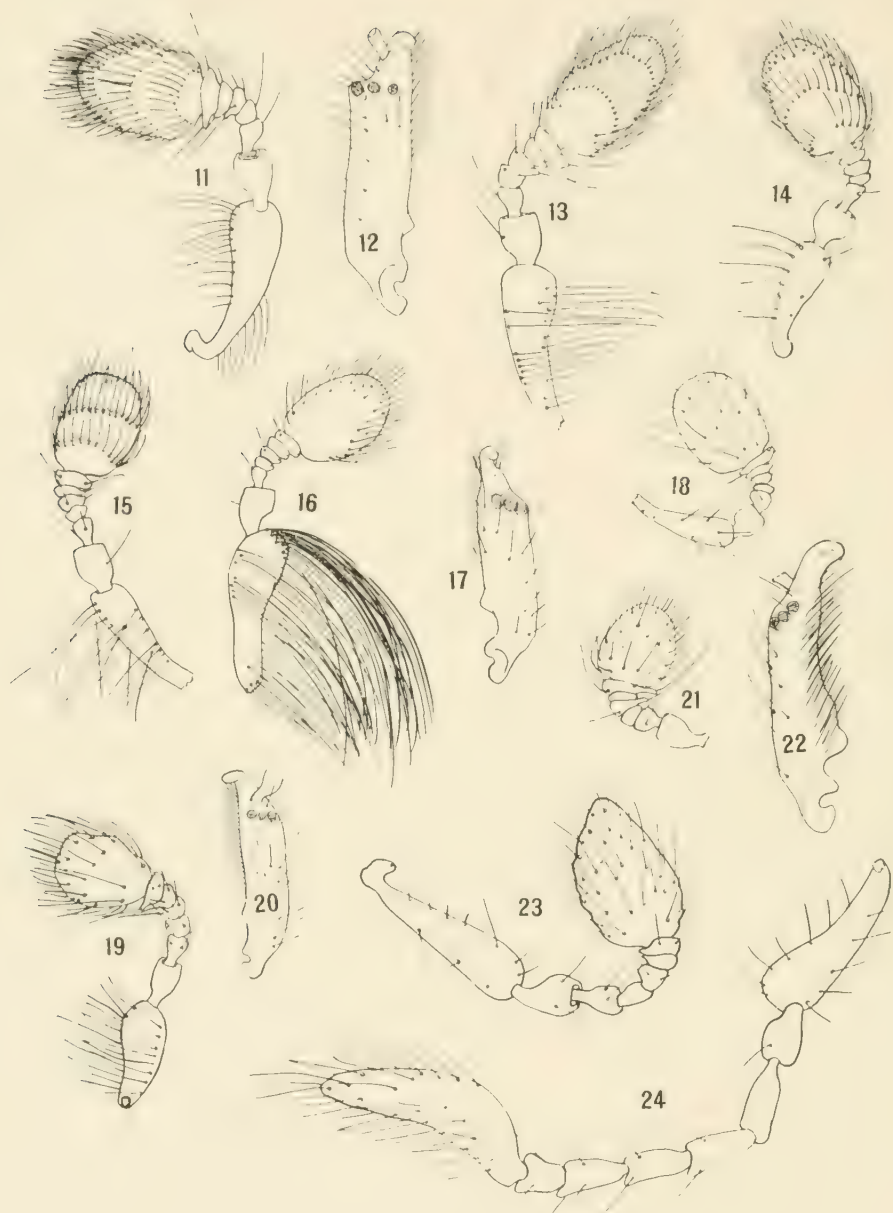
Host plant.—*Amyris balsamifera* L.

Type material.—Holotype, allotype, and 22 paratypes, U. S. N. M. No. 56414.

The holotype, allotype, and 4 paratypes were taken at Yauco, Puerto Rico, February 12, 1934, by R. G. Oakley; 18 paratypes were intercepted at New York in wood of *Amyris balsamifera* in shipment from Haiti, November 17, 1941.



1. *Hylocurus biconcavus*, new species: Face view.
2. *Hylocurus flaglerensis*, new species: Face view.
- 3, 4. *Hylocurus crinitus*, new species: 3, Antenna; 4, fore tibia.
- 5, 6. *Micracis knulli*, new species: 5, Antenna; 6, fore tibia.
- 7, 8. *Micracisella subnitida*, new species: 7, Antenna; 8, fore tibia.
- 9, 10. *Stenoclyptus rhois*, new genus and species: 9, Antenna; 10, fore tibia.



- 11, 12. *Thysanoes vachelliae*, new species: 11, Antenna; 12, fore tibia.
 13. *Thysanoes texanus*, new species: Antenna.
 14. *Thysanoes retamae*, new species: Antenna.
 15. *Pseudothysanoes huachucae*, new species: Antenna.
 16, 17. *Cryptocleptes insularis*, new species: 16, Antenna; 17, fore tibia.
 18. *Cryptocleptes colombianus*, new species: Antenna.
 19, 20. *Cryptocleptes acaciae*, new species: 19, Antenna; 20, fore tibia.
 21. *Cryptocleptes murilloi*, new species: Antenna.
 22-24. *Chalcohyus securigerus*, new genus and species: 22, Fore tibia; 23, antenna of male;
 24, antenna of female.

[All drawings made by Mrs. Claudelle L. Gaddis under the author's supervision.]



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NOTES ON SOME BARNACLES FROM THE GULF OF CALIFORNIA

By DORA PRIAULX HENRY

THE collection of Cirripedia made by Steinbeck and Ricketts (1941) has added considerably to our knowledge of the barnacles of the Gulf of California. Although most of the barnacles in the collection were identified by Ira E. Cornwall, of the Hopkins Marine Station, Pacific Grove, Calif., nine lots of their material were examined by the author. Five species or subspecies, one new, were represented in the nine lots; these are starred in the list below. Fifteen different barnacles have been reported so far from the Gulf of California (see Pilsbry, 1907 and 1916; Steinbeck and Ricketts, 1941; and Henry, 1941):

**Balanus amphitrite inexpectatus* Pilsbry.

Balanus concavus Bronn.¹

Balanus improvisus Darwin.

Balanus tintinnabulum californicus Pilsbry.

**Balanus tintinnabulum peninsularis* Pilsbry.

**Balanus trigonus* Darwin.

Tetraclita squamosa (Bruguère).²

Tetraclita squamosa stalactifera (Lamarck).

**Tetraclita squamosa stalactifera* forma *confinis* Pilsbry.

**Chelonibia patula* (Ranzani), new subspecies described herein (p. 370).

¹ Reported by Steinbeck and Ricketts (1941). Probably should be subspecies *pacificus* Pilsbry.

² Provisionally identified as subspecies *rubescens* Darwin (Steinbeck and Ricketts, 1941).

Chelonibia testudinaria (Linnaeus).

Coronula diadema (Linnaeus).

Chthamalus anisopoma Pilsbry.

Chthamalus fissus Darwin.

Lepas anserifera Linnaeus.

Further collecting in this region will undoubtedly increase the number of known species of these crustaceans. No species of the genera *Scalpellum*, *Alepas*, or *Heteralepas*³ has been reported from the Gulf of California, and only one species of *Lepas* and one species of whale barnacles have been found. It seems possible that *Balanus tintinnabulca coccipoma* Darwin, which extends from Panama to Mazatlan, might occur in this area. Also two species, *Balanus orcutti* and *Balanus regalis*,⁴ described by Pilsbry (1916), and each known from only one locality, on the west coast of Baja California, should be looked for in the Gulf.

Genus *BALANUS* Da Costa

BALANUS AMPHITRITE INEXPECTATUS Pilsbry

PLATE 31, FIGURES 15-16

Balanus amphitrite inexpectatus PILSBRY, 1916; NILSSON-CANTELL, 1933; STEINBECK and RICKETTS, 1941.

Localities: Estero de la Luna, Sonora, April 10, 1940, and Estero de Agiabampo, Sonora, April 11, 1940, on *Strombus gracilior* Sowerby.

This species was described by Pilsbry (1916) from a series of about 40 specimens growing on oystershells from the Gulf of California. Nilsson-Cantell (1933) reported *B. a. inexpectatus* from Bonaire and figured two terga to show the variation in the short, wide spur and also pointed out variations in the color of the wall. Specimens of *B. a. inexpectatus* identified by Ira E. Cornwall were collected by Steinbeck and Ricketts on the Mogote sand flats, La Paz Bay.

The specimens from Sonora are for the most part small; the largest is 13 mm. in diameter. The maximum diameter listed by Pilsbry is 15 mm. and by Nilsson-Cantell, 17 mm. They are described as "large barnacles" by Steinbeck and Ricketts. Unless eroded the parietes are dark with white lines as in the type, except in a few small specimens, which have light-colored parietes. The radii differ from Pilsbry's description. They vary in color from tan to the dull purple of the walls

³ Steinbeck and Ricketts (1941) erroneously state in their bibliography under Pilsbry (1907) that *Heteralepas quadrata* was reported from the Gulf of California by Aurivillius. Gruvel (1905) reported *Heteralepas quadrata* (Aurivillius) on *Lepas hillii californiensis* Gruvel from Lower California.

⁴ Von Kolosváry (1940) figures the rostrum, scutum, and tergum of a barnacle from Mollendo, Peru, which he calls *Balanus concavus regalis* Pilsbry.

and have white horizontal lines. The summits are oblique. The white alae have summits parallel to the basis. Internally the compartments are ribbed basally.

The pit below the adductor ridge of the scutum varies in depth. In one scutum the adductor and articular ridges are confluent (pl. 31, fig. 15). The valve is not roughened.

The spur of the tergum varies both in width and in length. The tergum shows patches of purple both externally and internally. The articular ridge is very prominent and reflexed.

Pilsbry did not describe the mouth parts and cirri of the specimens from the Gulf of California, but Nilsson-Cantell has figured the internal parts of the specimens from Bonaire. The mouth parts and cirri of the specimens from Sonora differ somewhat from the description of Nilsson-Cantell.

The labrian has two teeth on one side of the notch and three on the other. The lower pair of spines of the maxilla are larger and longer than the other spines and are set on a slight prominence. The fourth and fifth teeth of the mandible are very short and blunt. There are spines between the first and second teeth.

The posterior ramus of cirrus i is two-thirds the length of the anterior and has 9 segments. The anterior ramus has 18 segments. Both rami are protuberant. The rami of cirrus ii have 11 and 10 segments, strongly protuberant; the anterior ramus is one segment longer than the posterior. The lower segments of cirrus iii have spinules on the distal sutures and teeth on the anterior borders of the segments. The anterior ramus is 3 segments longer than the posterior. Median segments of cirrus vi have 6 pairs of spines and a few fine spinules on the distal borders. The segments of the posterior cirri are very elongate. The penis is very long, at least twice the length of cirrus vi and has a fine dorsal point.

BALANUS TRIGONUS Darwin

Localities: Estero de Agiabampo, Sonora, April 11, 1940, on *Callicectes bellicosus* Stimpson; Concepción Bay, Baja California, on *Navicula pacifica* Sowerby.

Genus TETRACLITA Schumacher

TETRACLITA SQUAMOSA STALACTIFERA forma CONFINIS Pilsbry

Locality: San Francisquito Bay, March 31, 1940, on *Acmaea daliana* Pilsbry, with *Chthamalus anisopoma* Pilsbry.

Genus CHELONIBIA Leach

CHELONIBIA PATULA DENTATA, new subspecies

Plate 31, Figures 4-13

Holotype.—U.S.N.M. No. 79409, from Estero de Agiabampo, Sonora, Mexico, April 11, 1940, on *Callinectes bellicosus* Stimpson.

Description.—Largest diameter, 18 mm.; height, 7 mm. Steeply conical. Orifice polygonal, large, varying from 63 to 77 percent of the greatest diameter of the shell. Surface white, smooth.

Radii rather wide, smooth and glossy, very little sunken below the parietes. Summits may be slightly oblique or very oblique, minutely jagged. Edge of outer lamina and recipient furrow minutely but distinctly toothed. Outer lamina of some compartments with one to three oblique ridges and pits, so that the lines of suture become toothed.

Alae: Summits oblique, edges minutely jagged.

Compartments: The rostrum is the highest compartment and at the base is about twice the diameter of the carina. The sutures on the internal surface of the rostrum are usually indistinct. The lateral compartment is slightly wider than the carinolateral. The compartments may be irregular in shape, especially if the barnacle is situated on the claws of a crab.

Sheath: Part formed by radii and alae horizontally grooved; part extending to base as pillars vertically ribbed with base denticulate; intermediate part smooth.

Inner lamina not well differentiated from sheath.

Vertical plates or septa: Alternate plates do not reach inner lamina; basal edges finely denticulate.

Interspaces between vertical plates filled up at extreme top of compartments; tubular for about two-thirds the height of compartments, as alternate vertical plates reach the inner lamina; exposed at base of compartment.

Opercular valves much smaller than the orifice, the opercular membrane attached rather high in the orifice.

Scutum: Occludent margin only slightly inflected except near basal margin; narrow but deep channel runs close to and parallel with margin from apex to base; not sinuous. Pit for adductor muscle deep. Articular ridge small but prominent, supporting a yellowish, horny membrane, which is attached to the inner part of the tergum. Basal ledge on exterior margin, narrows toward rostral end of scutum.

Tergum: Scutal margin wider than carinal edge, curved. Articular furrow wide and deep, receiving horny crest from scutum. Articular ridge represented by slightly raised edge of furrow.



- 1-3. *Chthamalus anisopoma* Pilsbry: 1, From San Francisquito Bay on *Acmaea dalliana* Pilsbry ($\times 3.5$); 2, Port San Carlos on *Tegula rugosa* Adams ($\times 2$); 3, Gabriel Bay on *Ostrea mexicana* Sowerby ($\times 3.5$).
- 4-13. *Chelonibia patula dentata*, new subspecies: 4, 5, Internal view of scutum and tergum ($\times 7$); 6, carina showing teeth ($\times 3$); 7, 8, external view of scutum and tergum ($\times 7$); 9, base of lateral compartment ($\times 2$); 10, internal view of rostrum ($\times 2$); 11, type specimen from the side ($\times 1.5$); 12, apical view ($\times 1.5$); 13, carinal view of type specimen ($\times 1.5$).
14. *Chelonibia testudinaria* (Linnaeus) from La Paz (from collection of M. C. Z.): Carina showing teeth ($\times 1$).
- 15, 16. *Balanus amphitrite inexpectatus* Pilsbry from Estero de la Luna: 15, Scutum ($\times 6$); 16, lateral view ($\times 1.5$).
(Photographs by Don Anderson.)

Longitudinal furrow narrow but distinct. Basal ledge narrower than in scutum; widest toward scutal margin. Labrum short, blunt teeth on each side of notch. The margin is hairy.

Palpi meet over labrum.

Mandible: Five teeth; fifth tooth united with inferior angle. Upper and lower margins hairy.

Maxilla: Margin straight with seven pairs of spines below the upper pair. Cluster of small spines on inferior angle.

Cirri. All the cirri have pectinated spines. The spines of the first two cirri are more coarsely pectinated than those of the posterior cirri. Cirrus i, subequal rami of 9 and 8 segments. Cirrus ii, subequal rami of 14 and 13 segments; both rami slightly protuberant. Cirrus iii, slenderer and longer than cirrus ii but much shorter than cirrus iv; rami have 21 and 20 segments; fine spines on distal sutures. Cirrus iv and v long and slender; spination like that of cirrus vi. Cirrus vi, median segments with two pairs of long spines and clumps of short spines at the base of each pair. There are multifid spinules on the distal sutures; the spines at the posterior-distal angle are two-thirds the length of the segment. Both rami have 38 segments; all the segments except those at the tip are twice as wide as long.

Penis nearly as long as cirrus vi; dorsal point lacking.

Remarks.—*Chelonibia patula dentata*, in addition to the presence of teeth on the lines of suture between some of the compartments, shows several minor differences from typical *C. patula* (Ranzani). The inner lamina is not so distinct from the sheath, the sutures on the interior of the rostrum are usually not very clear, and the inside of the radii are transversely grooved.

All except the small specimens show teeth on the outer lamina of at least the carina (pl. 31, figs. 11, 12, and 13). In the type specimen there are three teeth on each side of the carina and two teeth on the left carinolateral and left lateral but no teeth on the right or on the rostrum. The teeth differ from those of *C. testudinaria* (fig. 14) by being coarser and fewer in number (fig. 6), and they are oblique instead of parallel to the basis as in that species.

Chelonibia patula (Ranzani) has never been reported from the west coast of North America, although it is nearly a cosmopolitan species in tropical and subtropical waters. It has been recorded from the Hawaiian Islands by Gruvel, according to Pilsbry (1916). Seven specimens of typical *C. patula* from *Portunus sanguinolentus* from Honolulu from the collection of the Department of Zoology, University of Washington, have been examined and agree with Darwin's description of this species.

Chelonibia patula is the least modified species of this genus. The development of the teeth in one to three compartments in *C. patula*

dentata connects this subspecies with *C. testudinaria*, although in other respects the structure of the compartments has not changed. Whether typical *C. patula* occurs on the west coast of North America or whether this species is represented by subspecies *dentata* is an interesting question, which cannot be answered until extensive collecting has been done in this region.

Genus **CHTHAMALUS** Ranzani

CHTHAMALUS ANISOPOMA Pilsbry

PLATE 31, FIGURES 1-3

Chthamalus anisopoma PILSBURY, 1916; STEINBECK and RICKETTS, 1941.

Localities: Cape San Lucas, March 1940, on *Aemaca atrata* Carpenter; Gabriel Bay, Espiritu Santo Island, April 12, 1940, on *Ostrea mexicana* Sowerby; San Francisquito Bay, March 31, 1940, on *Aemaca dalliana* Pilsbry, with *Tetraclita squamosa stalactifera* f. *confinis* Pilsbry; Port San Carlos, Sonora, April 4, 1940, on *Tegula rugosa* Adams.

Specimens of *C. anisopoma* from the above localities vary somewhat from those described by Pilsbry and from the general description given by Steinbeck and Ricketts. The parietes may be white or buff, smooth (pl. 31, fig. 1), ribbed at base or strongly ribbed (fig. 2) as in the type form. The specimens vary in shape from conic to cylindrico-conic or they may be extremely flattened (fig. 3). The largest specimen is 7 mm. in diameter and 3.5 mm. in height.

Young barnacles have smooth parietes, which are usually dark gray. In a specimen 1.5 mm. in diameter the orifice is closed by both pairs of valves, and the right and left scuta and right and left terga are similar in shape and size. They resemble the left valves of the adult. Therefore this species is probably more closely related to *C. panamensis* than to *C. fissus*. When the barnacle reaches the diameter of 3 mm. the valves show the disparity in size and shape between the right and left valves typical of the adult.

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NEW SPECIES OF BUPRESTID BEETLES OF THE GENUS
AGRILUS FROM TRINIDAD

By W. S. FISHER

A SMALL collection of *Agrilus* beetles, reported as being the prey of a crabronid wasp in Trinidad, British West Indies, was received from E. McC. Callan for identification. These specimens have been compared with the descriptions of all the species described from the Guianas, Venezuela, Colombia, Panama, the Canal Zone, and Costa Rica, and since no species of *Agrilus* have been described from Trinidad, and none of the specimens received seem to be any of the species described from the localities listed above, they are here described as new.

Genus *AGRILUS* Curtis

AGRILUS CALLANI, new species

Male.—Elongate, slender, subcylindrical, moderately shining; head in front green, bronzy brown on occiput; pronotum dark green on disk, with a distinct purplish tinge, and narrowly bronzy along lateral margins; scutellum bronzy brown; elytra black, with a faint purplish tinge and ornamented with white pubescent spots; body beneath black, with a feeble bronzy tinge, and femora slightly greenish.

Head with front broad, wider at top than at bottom, without distinct median depression; sides parallel posteriorly, strongly converging anteriorly; surface nearly glabrous, coarsely, shallowly, confluent punctate, and densely granulose on front and vertex, longitudinally costate on occiput; clypeus narrow between antennae, deeply, arcuately emarginate in front; antenna short, extending to apical third of pronotum, serrate from fourth segment.

Pronotum quadrate, subequal in width at base and apex, widest along apical half; sides nearly parallel anteriorly, slightly converging posteriorly; posterior angles acute, slightly projecting outward; marginal and submarginal carinae slightly sinuate, widely separated anteriorly, united near base; anterior margin strongly sinuate, median lobe strongly produced and broadly rounded; base arcuately emarginate on each side, median lobe slightly produced, broadly subtruncate in front of scutellum; disk broadly, shallowly, transversely depressed along base, broadly depressed along lateral margins, vaguely, transversely flattened at middle near anterior margin, but without longitudinal, median depressions; prehumeral carinae strongly elevated, arcuate, united to marginal carinae at middle; surface nearly glabrous, coarsely, deeply, transversely rugose on disk, indistinctly punctate between rugae. Scutellum strongly, transversely carinate.

Elytra broadly, shallowly constricted in front of middle; tips separately broadly rounded, coarsely dentate, median tooth on each slightly longer than other teeth; surface vaguely depressed along sutural margins, densely, finely imbricate-punctate, each elytron ornamented with three small, white, pubescent spots, one in basal depression, one in front of middle, and one behind middle, and with a few white hairs along sutural margin near apex.

Abdomen narrowly exposed above, strongly convex beneath; surface densely, finely granulose, indistinctly punctate, nearly glabrous on median part, with sparse white pubescent spots at sides of first, third, fourth, and fifth sternites and on vertical portion of second sternite; suture obsolete between first and second sternites, the first sternite flattened at middle. Prosternum densely granulose, sparsely clothed with short, semierect, inconspicuous, white hairs; prosternal lobe long, broadly rounded in front; prosternal process broad, parallel at sides, truncate, with an obtuse median tooth at apex. Tarsal claws similar on all feet, cleft near middle, inner tooth of each slightly shorter than outer one, turned inward, but not touching tooth on opposite side.

Female.—Differs from the male in having the front of the head coppery and more feebly converging anteriorly, and the first abdominal sternite convex at the middle.

Length 6 mm., width 1.4 mm.

Type locality.—Talparo, Trinidad, British West Indies.

Type and allotype.—U.S.N.M. No. 56602. Paratype returned to Mr. Callan.

Remarks.—Described from three specimens (one male type), all collected at the type locality, December 25, 1941, by E. McC. Callan.

This species is allied to *Agilus fallax* Say but differs from that species in being slenderer and more strongly acuminate posteriorly, in

having the front of the head narrower with the sides strongly converging anteriorly, the clypeus narrow between the antennae, and the prosternal process not expanded behind the coxal cavities.

AGRILUS PRAEDAE, new species

Female.—Elongate, slender, subcylindrical, strongly shining, glabrous on dorsal surface, uniformly black, with a faint purplish reflection, except pronotum, which is reddish coppery.

Head with front broad, wider at top than at bottom, with a vague, broad, median depression; sides slightly sinuate, feebly converging from top to bottom; surface densely granulose, coarsely, vaguely punctate; clypeus rather narrow between antennae, shallowly, arcuately emarginate in front; antenna short, extending slightly beyond apex of pronotum, separate from fourth segment.

Pronotum slightly wider than long, subequal in width at base and apex, widest near apex; sides vaguely arcuate anteriorly, slightly, obliquely converging posteriorly; posterior angles rectangular; marginal carina straight, submarginal carina short, the two carinae parallel and widely separated anteriorly, united at middle; anterior margin strongly sinuate, median lobe strongly produced and broadly rounded; base arcuately emarginate on each side, median lobe slightly produced, subtruncate or vaguely emarginate in front of scutellum; disk broadly, shallowly, transversely depressed along base, more deeply, broadly depressed at middle along lateral margins, vaguely, transversely flattened at middle behind anterior margin, but without longitudinal, median depressions or prehumeral carinae; surface densely, finely granulose, finely, transversely rugose on disk, indistinctly punctate between rugae. Scutellum strongly, transversely carinate.

Elytra broadly, shallowly constricted in front of middle; tips separately broadly rounded and finely dentate; surface slightly flattened, densely, finely granulose, coarsely, densely imbricate-punctate.

Abdomen broadly exposed above, strongly convex beneath; surface densely, finely granulose, indistinctly punctate, sparsely, uniformly clothed with very short, recumbent, inconspicuous hairs; suture between first and second sternites vaguely indicated near middle. Prosternum densely granulose, coarsely, shallowly punctate, sparsely clothed with very short, erect, inconspicuous hairs; prosternal lobe long, broadly rounded in front; prosternal process broad, sides obliquely converging to apex, which is broadly rounded, with an acute, median tooth. Tarsal claws similar on all feet, cleft near middle, inner tooth slightly shorter than outer one, turned inward, touching tooth on opposite side.

Male.—Unknown.

Length 5.6–6 mm., width 1.4 mm.

Type locality.—Talparo, Trinidad, British West Indies.

Type.—U.S.N.M. No. 56603. Paratype returned to Mr. Callan.

Remarks.—Described from two females (one type) collected at the type locality, December 25, 1941, by E. McC. Callan.

This species resembles *Agilus infidelis* Fisher but differs from that species in having the antenna serrate from the fourth segment and in not having prehumeral carinae on the pronotum or pubescent spots on the elytra.

AGRILUS PICINUS, new species

Male.—Elongate, slender, subcylindrical, strongly shining, glabrous on dorsal surface; uniformly brownish black, with a slight greenish tinge on underside of body, and the head green in front, becoming brownish on occiput.

Head with front broad, wider at top than at bottom, with a vague, longitudinal, median depression on vertex; sides feebly converging from top to bottom; surface densely, finely granulose, sparsely, finely punctate, clothed with a few short, white hairs near clypeus; clypeus narrow between antennae, deeply, arcuately emarginate in front; antenna short, extending slightly beyond apex of pronotum, serrate from fourth segment.

Pronotum slightly wider than long, subequal in width at base and apex, widest near apex; sides nearly parallel anteriorly, obliquely converging posteriorly; posterior angles rectangular; marginal and submarginal carinae sinuate, widely separated anteriorly, united behind middle, the submarginal carina obsolete near apex; anterior margin strongly sinuate, median lobe strongly produced and broadly rounded; base angularly emarginate on each side, median lobe broadly subtruncate in front of scutellum; disk broadly, transversely flattened along base, deeply depressed at middle along lateral margins, vaguely flattened at middle in front of middle, but without distinct longitudinal, median depressions and prehumeral carinae; surface finely, shallowly, transversely rugose on disk, finely granulose and indistinctly punctate between rugae. Scutellum strongly, transversely carinate.

Elytra broadly, shallowly constricted in front of middle; tips separately broadly rounded and very finely dentate; surface flattened on basal half, longitudinally depressed along sutural margins on apical half, densely, finely granulose, densely, coarsely imbricate-punctate.

Abdomen broadly exposed above, strongly convex beneath; surface indistinctly granulose, with fine, transverse, crenulate lines, which are more distinct on basal sternites, very sparsely clothed with short, recumbent, white hairs; suture between first and second sternites obsolete. Prosternum densely, coarsely scabrous, densely clothed with short, erect, white hairs; prosternal lobe long, subtruncate or vaguely, broadly emarginate in front; prosternal process broad, sides nearly parallel,

obliquely converging at apex to an acute median tooth. Tarsal claws similar on all feet, cleft near middle, inner tooth of each slightly shorter than outer one, turned inward touching the tooth of opposite side.

Female.—Differs from the male in having the front of the head black and the pubescence on the prosternum shorter.

Length 6 mm., width 1.3 mm.

Type locality.—Talparo, Trinidad, British West Indies.

Type, allotype, and paratype.—U.S.N.M. No. 56604. Paratypes returned to Mr. Callan.

Remarks.—Described from five specimens, two males and three females (one male type), collected by E. McC. Callan. The type and allotype were collected at the type locality, December 25, 1941, and three paratypes were collected at Mundo Nuevo, Trinidad, April 4, 1943.

This species is allied to *Agrilus nigripennis* Waterhouse but differs from that species in having the front of the head wider and convex and the pronotum without a deep depression in front of the scutellum and without prehumeral carinae.

AGRILUS TRINIDADENSIS, new species

Male.—Elongate, rather slender, subcylindrical, feebly shining; head greenish black on front, becoming brownish black on occiput; pronotum and scutellum brownish black; elytra greenish black; underside of body black, with a faint bronzy-green reflection.

Head with front rather narrow, distinctly wider at top than at bottom, with a broad, longitudinal, median depression extending from occiput to clypeus; sides parallel along occiput and vertex, strongly, obliquely converging from vertex to bottom; surface densely granulate, coarsely, shallowly, and confluent punctate, clothed with a few short, semierect, inconspicuous, white hairs along sides and behind clypeus; clypeus narrow between antennae, deeply, arcuately emarginate in front. Antenna extending to apical third of pronotum, serrate from fourth segment.

Pronotum distinctly wider than long, wider at apex than at base, widest near apex; sides nearly parallel along apical half, then arcuately converging to near posterior angles, which are rectangular and slightly projecting outward; marginal and submarginal carinae slightly sinuate, widely separated anteriorly, the submarginal carina not connected with the marginal carina, and obsolete behind middle; anterior margin slightly sinuate, median lobe slightly produced and broadly rounded; base arcuately emarginate on each side, median lobe slightly produced, and broadly truncate in front of scutellum; disk rather deeply, broadly depressed in front of scutellum, very broadly, deeply depressed along

lateral margins, vaguely flattened at middle along anterior margin; prehumeral carinae strongly elevated, sinuate, extending from base to basal third, not united to marginal carinae; surface glabrous, finely, densely granulose, finely, irregularly rugose on disk, finely, densely punctate between rugae. Scutellum strongly, transversely carinate.

Elytra broadly, arcuately constricted in front of middle; tips separately, broadly rounded and finely dentate; surface slightly flattened on basal half, finely, densely scabrous, sparsely, uniformly clothed with very short, recumbent, inconspicuous hairs.

Abdomen narrowly exposed above, strongly convex beneath; surface obsolete granulose, with fine crenulate lines on basal sternites, sparsely clothed with short, recumbent, white hairs, with a longitudinal, median row of long, dense, white hairs on first and second sternites, and small patches of slightly denser, white hairs at sides of fourth and fifth sternites; suture between first and second sternites obsolete. Prosternum finely, densely granulose, densely clothed with moderately long, erect, white hairs; prosternal lobe long, broadly subtruncate in front; prosternal process broad, sides nearly parallel, apex obliquely converging to an obtuse, median tooth. Tarsal claws dissimilar on all feet; anterior and middle pairs cleft near tips, the teeth nearly equal in length and inner ones not turned inward; posterior pair cleft near middle, the inner tooth shorter than the outer one.

Female.—Unknown.

Length 7 mm., width 1.6 mm.

Type locality.—Talparo, Trinidad, British West Indies.

Type.—U.S.N.M. No. 56605.

Remarks.—Described from the single male type collected December 25, 1941, by E. McC. Callan.

This species is allied to *Agrius latifrons* Waterhouse but differs from that species in being of a different color, in having the front of the head narrower, with the sides strongly converging anteriorly, and not very deeply depressed at the middle, the surface of the pronotum more finely rugose, the elytra more strongly acuminate posteriorly and the surface more finely scabrous, and the abdominal sternites without distinct pubescent spots at the lateral margins.



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SOME FUNGUS BEETLES OF THE FAMILY ENDOMYCHIDAE IN THE UNITED STATES NATIONAL MUSEUM,
MOSTLY FROM LATIN AMERICA AND THE PHILIPPINE ISLANDS

By H. F. STROHECKER

THROUGH the kindness of Dr. E. A. Chapin and other officials of the U. S. National Museum, I have had opportunity to study some of the endomychids in the collections of that institution. Although comparatively few in number, these have proved of considerable interest and include a number of new species. In addition, the following records are of note:

Eumorphus marginatus (Fabricius): A single male specimen from Baguio, Luzon, P. I.

Eumorphus tetraspilotus Hope: A male and a female from Palawan, P. I.

Cyclotoma pardalina (Gerstaecker): Eleven specimens from Mindanao, P. I. These are indistinguishable from specimens from Java, the type "locality."

Cyclotoma testudinaria Mulsant: Three specimens from Palawan. I suspect *pardalina* and *coccinellina* are color varieties of *testudinaria*.

Genus BECCARIA Gorham

BECCARIA SEPTEMGUTTATA, new species

FIGURE 12, *k*

Highly convex, black and shining, with the lateral portions of the pronotum, three rounded spots on each elytron, and a median spot common to both elytra reddish yellow. Head and antennae, except basal three or four joints, black. Under surface black except mesosternum and prothorax, which are yellow. Legs black with piceous tinge. Antennae half as long as body, joint 2 quadrate; joints 3 to

6 longer than wide; joints 7 and 8 stouter than preceding, quadrate; joint 9 as long as wide; joint 10 transverse; joint 11 oval, as long as 9 and 10 together. Pronotum three times as broad as long, finely, evenly, and not closely punctured, narrowly margined; basal foveae minute, very shallow; between these the pronotum is finely margined. Elytra sparsely and coarsely punctured, especially in the regions of the scutellum and humeri; the punctures finer toward apex.

Type.—U. S. N. M. No. 55878.

Type locality.—Surigao, Mindanao, P. I. (C. F. Baker). Possibly the same as *B. septemmaculata* Pic from Malacca but a little smaller and with the legs black. Length 3.5 mm., width 1.75 mm.

BECCARIA DENTICORNIS, new species

Generally similar to the preceding but differs in several features, including size. Antennae entirely black, joints 2 to 6 longer than wide; joints 9 and 10 triangularly acuminate internally; joint 11 oval. Head black. Pronotum three times as broad as long, finely margined at sides and base; basal foveae minute and shallow. The pronotum is black at base between the foveae and has a median black area extending anteriorly to the front margin, leaving the sides broadly yellow. The light spots of the elytra are arranged as in *B. septemguttata*, but the two anterior ones are quite elongate and the median common one is much smaller. The punctures of the elytra are very coarse in the humeral and scutellar regions. Legs, epipleurae, and the epimera and lateral area of metasternum sooty. Otherwise the under surface is dull yellow. The metasternum is very coarsely punctured toward the middle. Length 4.5 mm., width 3.5 mm.

Type.—U.S.N.M. No. 55879.

Type locality.—Island Samar, P. I. (C. F. Baker).

Genus MYCETINA Mulsant

MYCETINA CYANESCENS, new species

An elongate species having the general aspect of *Endomychus* but with an exceptionally developed stridulatory membrane on the front margin of the pronotum. Entirely black except the abdomen, which is reddish yellow, and the elytra, which are steel-blue. Each elytron bears, just behind the humeral callus, a transverse yellow bar, which closely approaches the lateral margin but is separated from the suture by about its own breadth. This bar is twice as wide as long. The antennae are half as long as the body, slender, joint 3 three times as long as joint 2 but not much longer than 4; joints 2 to 8 progressively shorter. Club distinct but gradually formed, not much longer than joints 6 to 8 together; joint 11 transverse, truncate. Head, thorax,

and elytra finely and sparsely punctured and finely alutaceous. Each puncture bears a minute seta. Thorax with sides almost straight, convergent from the acute hind angles to the acutely produced front angles, narrowly margined. Lateral sulci deep, curved, and reaching almost to middle of disk, basal sulcus broad, deep. There is a circular depression within the hind angle. Scutellum as long as broad, rounded behind. The elytra are slightly depressed at the scutellum, elongate, little wider at base than the pronotum but broadening gradually to posterior third, thence evenly convergent; tips separately rounded. Legs long and slender, femora subelavate. Length 4.75 mm., width 2.6 mm.

Type.—Female, U.S.N.M. No. 55880.

Type locality.—Tat-sien-lu, Szechwan, China (D. C. Graham).

A single male specimen, allotype (author's collection), closely resembles the type but is a little larger, has the sides of the pronotum straight, and the front tibia bears a low, blunt tubercle on its inner face at the distal third. Data same as for type. I have not used the male as the type because all its tarsi are damaged. This distinctive species is unusual for a *Mycetina*, but the mouth parts and triangular mesosternum lead me to refer it to that genus. It belongs to the section that includes *M. marginalis* (Gebler) [= *obliquesignata* Gorham] and the species that have been referred to *Phacomychus*.

Genus ENGONIUS Gerstaecker

ENGONIUS EXCISIPIES, new species

FIGURE 12, h

Highly convex for the genus, glabrous, moderately shining, of bronzy color, each elytron with a small yellow spot on the posterior part of the humeral callus and another of equal size at the same level and halfway between the callus and suture, and a yellow crossbar behind the middle. The crossbar is bidentate anteriorly and unidentate (internally) posteriorly and is equally removed from the lateral margin and suture. Antennae black, slender, joint 3 twice as long as 4, club broad, flattened but hardly compact. Antennal ridges of head very prominent. Pronotum strongly transverse, its front angles produced and acutely rounded, sides narrowly margined, rather deeply sinuate behind the middle, hind angles divergent and acute. Basal foveae very deep and short, basal sulcus fine and deep. Disk of pronotum finely, sparsely punctured, the punctures thicker and coarser at sides. The front margin has a very broad membrane. Elytra strongly elevated, markedly depressed around the scutellum and anterointernal to the humeral callus, rather coarsely and closely punc-

tured, narrowly margined. Mesosternum broadening anteriorly, subfoveate on each side. Prosternum hardly surpassing front coxae, broad, widely excised at tip. Legs long and slender, the last tarsal joint especially so; front tibia straight, middle tibia straight, toothed and excised internally beyond the middle; hind tibia slightly incurved near apex. Last ventral segment with its posterior margin undulate.

Type.—Male, U.S.N.M. No. 55881.

Type locality.—Szechwan, China (D. C. Graham).

Genus *HELIOBLETUS* Gorham

HELIOBLETUS PHILIPPINENSIS, new species

FIGURE 12, *m, n*

Characters of *Heliobletus* Gorham, ferruginous, clothed with sparse, tawny pubescence. Antennae more than half as long as body, ferruginous except for last four joints and apex of joint 7; joint 1 massive; joints 2 to 5 longer than broad, joints 6 and 7 quadrate, joint 8 beadlike, joint 9 globose, greatly swollen, rounded above, slightly concave below, joint 10 triangular and transverse, joint 11 oval. Pronotum a little broader than long, rather strongly but evenly convex, finely and closely punctured with a row of coarser punctures across the base. Front angles produced, acuminate. Sides finely margined, roundly contracted at middle, hind angles slightly divergent and acute. Scutellum transverse. Elytra decidedly but not much wider at base than pronotum, evenly, strongly convex, their lateral margins invisible from above, finely and closely punctured. Front tibia straight, simple; middle and hind tibiae enlarged in distal two-thirds, the middle one slightly incurved one-third the distance from apex. Length 3.6 mm., width 1.5 mm.

Type.—Male, U.S.N.M. No. 55882.

Type locality.—Zamboango, Minandao, P. I. (C. F. Baker).

The four species of *Heliobletus* hitherto known are all from Borneo and very similar. The specimen before me evidently does not belong to any of the three species described by Arrow. The possibility remains that it is the male of *H. serrilis* described by Gorham from a single female specimen from Borneo.

Genus *SAULA* Gerstaecker

SAULA LOBATIPES, new species

FIGURE 12, *l*

Allied to *S. curvipes* Arrow but less convex and with slenderer antennae, which are, however, similar to those of *curvipes*; joint 1

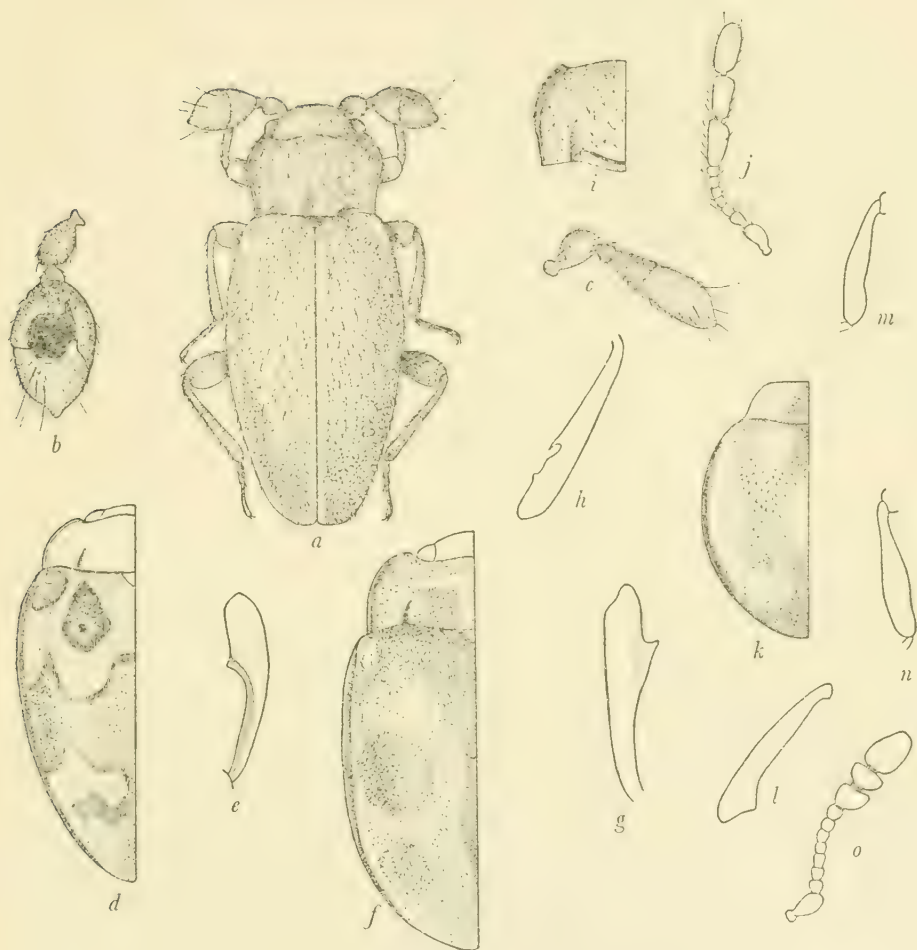


FIGURE 12.—ENDOMYCHID BEETLES

- a-c*, *Trochoideus coelo-antennatus*, new species: *a*, Type; *b*, ventral view of antenna of type; *c*, antenna of allotype.
- d, e*, *Epopterus decoratus* Kirsch: *d*, Specimen from Peru; *e*, front tibia of male.
- f, g*, *Anidrytus pardalinus*, new species: *f*, Type; *g*, front tibia of type (male).
- h*, *Engonius excisipes*, new species: Middle tibia of type (male).
- i, j*, *Parasymbius macrocerus*, new species: *i*, Pronotum of type; *j*, antenna of type.
- k*, *Beccaria septemguttata*, new species: Type.
- l*, *Saula lobatipes*, new species: Front tibia of type (male).
- m, n*, *Heliobletus philippinensis*, new species: *m*, Middle tibia of type (male); *n*, hind tibia of type.
- o*, *Stenotarsus monrovius*, new species: Antenna of type (male).

stout, longer than broad, joint 2 half as long as 1, about quadrate, joint 3 half again as long as 2, slender, joint 4 equal to 2, joint 5 as long as 3 but stouter toward apex, joints 6 and 7 each a little shorter than 5, joint 8 equal to 4, joint 9 about as long as 3, a little longer than broad, joint 10 quadrate, joint 11 oval, as long as 9 and 10 together. Except for the outer eight joints of the antennae, which are black, the insect is entirely ferruginous. The most distinctive feature is the front tibia, which is feebly undulate and distally expanded on its inner face into a broadly triangular flange. Middle tibia straight, hind tibia very feebly incurved. Length 2.5 mm.

Type.—Male, U.S.N.M. No. 55883.

Type locality.—Cuernos Mountains, Negros, P. I.

Another specimen, a female, bearing the same data as the type, is very similar to the type except for the tibiae, which are all simple. Its length is 2.75 mm. I designate it the allotype.

Genus STENOTARSUS Perty

STENOTARSUS MONROVIUS, new species

FIGURE 12, o

General aspect of *S. guineensis* Gerstaecker but much smaller, shorter, and more convex. Ferruginous except apical joint of antennae, which is darker but hardly black. Antennae stout, scarcely longer than head and pronotum, joints 2 to 8 beadlike, transverse, joints 9 and 10 suddenly broadened, short and transverse, not flattened, joint 11 a little shorter than 9 and 10 together, flattened only toward the apex, which is truncate. Pronotum three times as broad as long (at middle), sides evenly rounded but much less so than in *guineensis*. The elevated margin is very broad and somewhat deflexed in front, narrowed posteriorly to half its anterior width. Hind angles right. Disk of pronotum evenly, not greatly convex, finely and fairly closely punctured. Elytra strongly convex, finely punctured and with widely spaced, coarse, shallow punctures. These larger punctures are especially coarse and numerous along the sides but are discernible to the apex whereas in *guineensis* they are evanescent behind the middle. Length 3 mm., width 2 mm.

Type.—Male, U.S.N.M. No. 55884.

Type locality.—Mount Coffee, Liberia (O. F. Cook).

Another male specimen identical with the type and bearing the same data is designated paratype and is in the author's collection.

STENOTARSUS ATRIPENNIS, new species

Elongate oval, moderately convex, ferruginous with antennae and most of elytra black. Antennae with joint 1 short, subglobose, joints 2 and 4 to 7 about as long as broad, joint 3 a little longer than broad,

joint 8 beadlike, joints 9 and 10 each about as broad as long, joint 11 oval, a little shorter than 9 and 10 together. Pronotum very transverse, its sides strongly rounded behind the front angles, parallel in posterior half; raised margin broad, narrowed posteriorly; basal foveae deep; basal sulcus broad and deep and continued obliquely to the hind angles. Disk of pronotum evenly, moderately convex, minutely and sparsely punctured, its pubescence sparse and erect. Scutellum transverse. Elytra three times as long as pronotum, as wide at base as pronotum, thence gently and slightly widened, gradually convergent to apex, moderately convex, coarsely, sparsely and shallowly punctured, pubescence sparse and semierect. The elytra are shining and black except a very narrow basal border, a wider sutural stripe and a still wider marginal stripe, which are red. The red areas are continuous with each other. Length 3 mm.

Type.—Male, U.S.N.M. No. 55885.

Type locality.—Ma-Ao, Occidental Negros, P. I., at light (W. Dwight Pierce).

An unusual type among the oriental species of *Stenotarsus*. Its general appearance is strikingly similar to that of *S. militaris* Gerstaecker from Mexico, except the new species lacks the black patch on the pronotum.

STENOTARSUS FLAVOMACULATUS, new species

Long-oval, strongly convex, black and moderately shining with the umbo, an anterior juxtasutural spot and a postmedian transverse bar on each elytron reddish yellow. Antennae a little longer than head and pronotum, black except for the first two joints and apical half of the last, which are piceous; joints 2 and 8 about as long as broad; joints 3 to 8 subequal in length but progressively stouter; joints 9 and (especially) 10 transverse, little flattened; joint 11 oval, about as wide as long. Head finely and sparsely punctured. Pronotum abruptly and strongly convex, finely and sparsely punctured with correspondingly sparse pubescence; raised margins moderately broad and much deflexed at the front angles; hind angles right; basal foveae very deep, grossly punctiform; basal sulcus shallow, marked by a row of coarse punctures close to base of pronotum. Scutellum oval, transverse. Elytra highly but not abruptly convex, rather coarsely and sparsely punctured, pubescence sparse; umbones inflated, entirely reddish yellow. The juxtasutural spot has vague outlines but is broadest internally and triangularly narrowed toward (or to ?) the umbo. The postmedian bar is concave anteriorly, convex posteriorly and extends from the lateral margin almost to the suture. Under surface, including legs and elytral epipleurae, pitchy red. The epipleurae are coarsely punctured. Length 2.5 mm., width 1.5 mm.

Type.—Male, U.S.N.M. No. 55886.

Type locality.—Cuernos Mountains, Negros, P. I. (C. F. Baker).

STENOTARSUS FLAVOSCAPULARIS, new species

Generally similar in markings to the preceding but easily distinguished by the much shorter and very convex form and the strongly shining elytra. Antennae half as long as body, first two joints pitchy red, remainder black except apical joint, which is reddish (probably yellow in life); joints 2 to 7 subequal in length, joint 8 a little shorter, joints 9 and 10 broadly obconical; the outer-apical border of joint 11 almost a semicircle, the inner border slightly convex; all three club joints very little flattened. Pronotum very much as in *S. flavomaculatus*, black, shining, very finely and sparsely punctured, each puncture bearing a fine, erect seta. Elytra highly elevated, black, shining, finely, sparsely punctured and with correspondingly sparse, erect pubescence; umbo moderately inflated, entirely gold-yellow. There is a broad bar of like color between the umbo and suture and another bar of similar shape and color between the middle and apex of each elytron. Under surface and legs black; tarsi and coxae pitchy red. Length 2 mm., width 1.25 mm.

Type.—Male, U.S.N.M. No. 55887.

Type locality.—Dapitan, Mindanao, P. I. (C. F. Baker).

Three specimens bearing the same data as the type are designated paratypes. On one of these the anterior elytral spot is small and rounded; on another it is confluent with the light color of the umbo; and on the third it is similar to that on the type, i. e., transversely rectangular. A specimen from St. Thomas, Luzon, is very similar to the type, while yet another, from Lamac, Luzon, has the elytra broadly yellow at the base and the postmedian mark is a bar extending from the suture to the lateral margin. This last specimen may represent still another species, since in addition to the differences in markings the punctures of the pronotum and elytra are coarser. In its markings and puncturation it resembles *S. flavomaculatus* but is identical in shape with the type of *S. flavoscapularis*, and the difference in this respect is too great to admit the hypothesis of intergradation. Both these species present striking divergences from other species of *Stenotarsus*, but there are no characters worthy of generic recognition.

Genus ANIDRYTUS Gerstaecker

ANIDRYTUS PARDALINUS, new species

FIGURE 12, f, g

Size large for the genus, strongly but evenly convex (section A of Gerstaecker). General color deep rust-red. Antennae with five basal

joints red; joints 6 to 10 black; joint 11 black, with its apical half red. The lateral sulci of the pronotum are shallow but sharply impressed and extend to the middle of the disk. Between these sulci and occupying most of this area is a pair of large, quadrate, black spots, narrowly separated from each other. On the elytra the basal third, including the humeri, black; internally this black area is continued as a narrow stripe along the suture, broadening a little on its apical third, thence becoming evanescent. At the middle of each elytron there is a large, rounded, black spot, laterally placed and behind this a similar but considerably smaller spot. The entire upper surface is clothed with a short, declivent, coppery pubescence. The puncturing is everywhere fine and sparse except at the sides of the pronotum, where it becomes a little denser and coarser. The front tibia bears a broad, sharp tooth internally at its distal third. Another feature, probably sexual, is a densely pubescent area of semicircular shape at the middle of the posterior margin of the first abdominal segment. Length 8 mm., width 4 mm.

Type.—Male, U.S.N.M. No. 55888.

Type locality.—Costa Rica (F. Nevermann).

Genus MILICHIUS Gemminger and Harold

MILICHIUS IMPRESSICOLLIS, new species

General aspect of *M. ampliatus* (Gorham). Ferruginous, the elytra with aeneous sheen. Antennae stout, joints 3 and 4 subequal, twice as long as broad; joints 5 to 7 little longer than broad; joint 8 quadrate; joints 9 and 10 cylindrical, each equal in length to joint 3 but stouter; joint 11 oval, three-fourths as long as 9 and 10 together and very little wider. Joints 1 to 5 ferruginous; joints 6 to 8 and 11 black; 9 and 10 light yellow. Pronotum transverse, front angles produced and acutely rounded, sides bisinuate and reflexed, forming a broad groove within the margin, disk coarsely, irregularly punctured (as is the head also), smoother along midline and with a deep, large impression on each side. Basal foveae short, linear; basal sulcus fairly deep, close to hind margin of pronotum. Elytra broader at base than pronotum, thence slightly widened, somewhat tapering posteriorly. Umbone elevated, subcarinate laterally. Disk of elytra very finely and sparsely punctured, the area around the umbo and posterior to it coarsely and confluent punctured. Prosternum broad, coarsely punctured. Under surface, including bases of femora ferruginous; apical half of femora and proximal half of tibiae infuscate; distal half of tibiae and the tarsi yellow. Length 3.75 mm. The yellow ninth and tenth antennal joints and bifoveate pronotal disk are distinctive.

Type.—U.S.N.M. No. 55889.

Type locality.—Mount Makiling, Luzon, P. I. (C. F. Baker).

Genus **ENDOMYCHUS** Panzer**ENDOMYCHUS FLAVUS**, new species

In shape this species resembles those referred to *Cyanauges* by Gorham. Antennae a little longer than head and pronotum, all its joints longer than broad, joints 9 and 10 obconical, joint 11 oval, scarcely longer than 10; these three joints form a distinct but little flattened club. Basal foveae of pronotum deep, continued anteriorly as curved grooves, which reach to middle of disk; basal sulcus broad and shallow; hind angles subacute; the sides of pronotum feebly sinuate in front of hind angles, convergent anteriorly; front angles a little produced, rounded. Elytra hardly wider at base than pronotum, rapidly broadened to middle, thence gradually convergent, the apical portion of the elytra subattenuate. Clear reddish yellow, with the clypeus, eyes, antennae, legs, and two small spots on each elytron black. The first elytral spot is placed behind the umbro and the second in the same longitudinal line. The distance between the first and second spots is about equal to that between the first spot and the base of elytron, and both spots are closer to the lateral margin than they are to the suture. Head finely and thickly, pronotum and elytra finely and very sparsely, punctured; entirely glabrous above. Under surface of same color as upper, finely pubescent. The maxillary palps are black, the last joint hatchet-shaped (*Endomychus* s. s.). Length 4.5 mm., width 2.5 mm.

Type.—U.S.N.M. No. 55890.

Type locality.—Near Mupin, Szechwan, China (D. C. Graham).

Genus **PARASYMBIUS** Arrow**PARASYMBIUS MACROCERUS**, new speciesFIGURE 12, *i, f*

Characters of the genus as defined by Arrow, tarsi long, filiform, quasi-3-jointed. Antennae with club joints greatly enlarged and elongated, joint 1 stout, curved, joint 2 longer than broad, joint 3 very slender, joints 4 to 7 progressively broader, joints 8 and 9 obconical, three times as long as broad, joint 10 about as long as 9, rounded at tip; the club joints (8 to 10) together are considerably longer than the footstalk of antenna (joints 1 to 7). Joints 5 to 10 black, others piceous. Pronotum transverse, rather broadly margined, narrowed before and behind, basal sulcus deep, curved, lateral impressions broad posteriorly, extending anteriorly to the middle of disk, which is finely and very sparsely punctured. Elytra roundly convex, as wide at base as pronotum, considerably widened at middle, roundly convergent behind, finely and sparsely punctured. The insect is entirely ferrugi-

nous (except for outer antennal joints) and the pubescence of the upper surface is erect and sparse, especially upon the pronotum. Length 1.5 mm. From the exposed sixth abdominal segment I judge the specimen to be a male.

Type.—Male?, U.S.N.M. No. 55891.

Type locality.—Mount Makiling, Luzon, P. I. (C. F. Baker).

The only other species of the genus known at present is the genotype, *P. philippinensis* Arrow, described from a single specimen, the sex of which was not noted. The insect before me meets all the generic requirements proposed by Arrow for *Parasymbius*. He makes no mention of the prosternum, but the present species has the prosternum roundly carinate before the front coxae, flattened between them and margined; posteriorly it is prolonged beyond the coxae, its tip a little deflexed and rounded. It differs from Arrow's species in its smaller size, greater length of antennal club, and sparser pubescence.

Genus TROCHOIDEUS Westwood

TROCHOIDEUS COELO-ANTENNATUS, new species

FIGURE 12, a-c

Slenderer and less densely pubescent than *T. americanus* Buquet and *T. desjardinsi* Guérin. Clypeus truncate anteriorly, the clypeo-frontal suture a broad, low arc. Front shallowly and broadly depressed on each side near the insertion of antennae. Eyes prominent and coarsely granulate. Antennae relatively shorter than in the two species referred to above, massive; joint 1 bulbous, joint 2 very small, narrow at base and rapidly expanded to its apex, joints 3 and 4 together forming a large bulb with nipplelike apex. There is no fifth joint apparent. On the under side these two joints are so deeply concave as to appear hollow; the margin of this concavity is auriculate. Mandibles with slender, aciculate apex. Labium, labial and maxillary palps as in *T. desjardinsi*. Pronotum almost twice as wide as long, front angles rounded, sides broadened before the middle, thence subsinuately narrowed to the slightly acute hind angles. The pronotum has a shallow, parabolic impression at the middle of its base and a transverse impression on either side of this. Scutellum transverse, rounded behind. Umbones of elytra prominent but not inflated. Elytra evenly and moderately convex, gently widened in anterior third, thence evenly rounded to the apices, which are subtruncate. The entire surface of the body is clothed with fine, declivent, gray hairs. Elytra brown with a pale, narrow sutural stripe but without a sutural stria. Head similar in color to elytra; pronotum, antennae, legs, and mouth parts yellow-umber. Length 3 mm.

Type.—Male, U.S.N.M. No. 55892.

Type locality.—El Quemado, Jujuy, Argentina (G. L. Harrington).

Allotype, female (U.S.N.M.), same data as type. Identical with type except for color and antennal structure. The antennae have the first and second joints as in the male, joint 3 three times as long as 2, as broad at its base as apex of joint 2, thence expanded to about twice its basal diameter. Joint 4 is about as long as 3, broadening toward its apex, which ends in a small nipplelike elevation. In figure 12, *c*, the third antennal is considerably foreshortened. The color of the allotype is darker and more uniform than that of the type, and the sutural stripe is scarcely evident. I am inclined to think that all the specimens are teneral and that the allotype more nearly represents the mature condition. Besides the type and allotype the U. S. National Museum collection contains an imperfect male paratype, and there is a male paratype in the author's collection; data same as for type.

Figure 12, *d, e*, was made from a specimen of *Epopterus* from Peru. Although it lacks the pronotal spots I consider it an individual of *E. decoratus* Kirsch.



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SUMMARY OF THE COLLECTIONS OF SNAKES AND CROCODILIANS MADE IN MEXICO UNDER THE WALTER RATHBONE BACON TRAVELING SCHOLARSHIP

By HOBART M. SMITH

By aid of the Walter Rathbone Bacon Traveling Scholarship of the Smithsonian Institution, my wife and I were enabled to spend the greater part of two years, from September 1938 to August 1940, collecting reptiles and amphibians in certain areas in Mexico. The work was intended primarily to supplement other investigations I had conducted previously, but various opportunities were taken to augment the collection of the National Museum by brief visits to areas that had been formerly studied. We worked in several areas I had not visited before, and the unusual opportunity was offered to collect in numerous localities during the dry season. Practically all previous work had been done during the rainy season, when the active fauna is frequently much different from that of the dry season. Unfortunately, it was impossible to reach certain other critical areas included in the original itinerary, in spite of the very considerable length of time at our disposal. Even had we been able to do twice as much field work as was actually accomplished, the same statement probably could be made; Mexico will remain an extraordinarily fertile field for local studies for many years.

After our return the authorities of the Smithsonian Institution very kindly approved the continuation of the Scholarship until September 1941, to afford a much-needed respite from other duties for study of the collections secured. The simple task of sorting the

miscellaneous collection of over 20,000 specimens occupied almost one-tenth of this time. During the remainder of the year most of the snakes and lizards were briefly studied. According to original plan, a report on the entire collection was to be prepared, but circumstances have unduly delayed this. Rather than await its completion, the report will be issued in parts. This, the first, treats the snakes and crocodiles only.

The total number of snakes obtained is 1319, representing 175 species and subspecies. Among these are about 25 new forms, most of them described in previous papers. Fifty-four are new to the Museum's Mexican collection. Examples of all three species of crocodiles known to occur in Mexico were found, including some 19 specimens; only one of these species was previously represented in the Museum's collection from Mexico.

While the following notes are based largely upon the specimens procured under the Bacon Scholarship, it has appeared desirable to record also other Mexican species (exclusive of Baja California) represented in the Museum, though these are not so thoroughly annotated as the specimens deserve. In all, 116 forms are thus added, making a total of 291 mainland Mexican forms—about three-fourths of the total ever recorded—represented in the United States National Museum. The specimens already in the Museum are listed after the Bacon specimens in the discussion of each species; species not represented in the Bacon collection have an asterisk preceding the name; and species in the Bacon collection that are not otherwise represented in the Museum's collection (or that are not represented by Mexican specimens) are indicated by a statement in the final paragraph of the discussion concerned. Three species of *Scaphiodontophis* have been omitted because of an unexpected delay in the publication of their descriptions elsewhere.

In several previous papers (see bibliography: Smith, 1939-1942g; Smith and Taylor, 1941; Taylor and Smith, 1942a, b) discussions or descriptions of certain specimens of the Bacon collection have appeared. These notes are not repeated here, but a reference to them is given in synonymy form for each species. References to more than nominal mention of other specimens in the U. S. National Museum are in footnotes.

OPHIDIA

ADELOPHIS COPEI Dugès

One specimen is in the collection, from Yautepéc, Morelos (No. 110335). This has 143 ventrals, 53 caudals (male; 2 or 3 scales missing at tip of tail); 5 infralabials and supralabials; fifth supralabial

separated from parietal by an elongate temporal; otherwise as in neotype.

The Museum has no others.

The type is not now in existence, as Dugès (1887, p. 20) states, "No tengo en mi poder el cuerpo mismo del reptil, pero he conservado un cráneo en muy buen estado . . ." A specimen now present in the Dugès Museum, Guanajuato, is labeled "Cupátaro" (perhaps Tupátaro, Guanajuato) and is designated neotype. It may be described as follows:

Head not flattened, somewhat conical; portion of rostral visible from above narrow, but its length about two-thirds length of internasals; latter about a third broader than long, their length slightly less than half that of prefrontals; latter nearly twice as broad as long, extending onto sides of head between preocular and nasal, in contact with second and third supralabials; greatest width of frontal about three-fifths length of same; posterior angle of frontal nearly a right angle; sides of frontal slightly sinuous; greatest width of a supra-ocular slightly more than greatest width of frontal; greatest length of parietal one and one-half times the greatest length of frontal, their length about equal to their distance from tip of snout.

Nasal large, its length as great as its distance from orbit, the two separated from each other medially by a distance equal to half the greatest width of an internasal; nasal divided below naris (on one side there is an incomplete suture above the naris), the anterior moiety about half the size of the posterior; no loreal, the prefrontal in contact with labials; one preocular, twice as high as long; diameter of orbit about two-thirds its distance from rostral; pupil round; third and fourth supralabials entering orbit, the third narrowly; two postoculars, the upper about twice as large as lower, which is wedge-shaped; five supralabials, the last much the largest, its length nearly equal to length of others combined; fifth supralabial broadly in contact with parietals, bordered posteriorly by three scales.

Labial border of mental apparently slightly greater than that of rostral (a small injury on right side); five infralabials, the first in contact with its fellow medially; fifth infralabial as long as the third and fourth combined; two pairs of chin shields, the posterior slightly the longer and broader than anterior; three scales between chin shields and first enlarged ventral.

Scale rows 15-15-15; dorsal scales keeled, except those of outer two rows on each side; scales of first (outer) row broader than long, those of second row as broad as long and at least twice as broad as scales of inner dorsal rows; some of the scales appear to have two pits, but this cannot be determined because of the flabby character of

the scales (the original scales lost); ventrals 132; anal entire; caudals 54, divided, excluding the terminal spine; male.

The specimen has lost all its original scales; the ground color of the back is now light slate-gray; a narrow dark line originating at the posterior margin of the orbit passes posteriorly along the suture between the parietal and fifth supralabial (most of the stripe on the labial) and continues down the sides of the body on the third and fourth scale rows; it disappears completely just before reaching the anus; a median light line is very dimly visible, apparently occupying but one scale row posteriorly, wider on the neck; at present the stripe cannot be discerned on the tail.

Mental and gular region cream; dorsal color encroaching on edges of ventrals, which are otherwise gray-cream; the extreme anterior edge of each ventral is black, the color concealed beneath the posterior edge of the preceding ventral; the extreme anterior edges of most of the dorsals are black, particularly on the scales of the first and second rows; ventral surface of tail somewhat more cream-colored than belly.

Length of head, parietal to rostral, 8.5 mm.; total length, 252 mm.; tail, 53 mm.

The specimen is in excellent condition except for the loss of the original scales and a slight injury in the mental region.

***ADELPHICOS QUADRIVIRGATUS SARGII (Fischer)**

The Museum has four¹ from Mexico, three (Nos. 46612, 46614-5) definitely from Chicharras, Chiapas, and one other (No. 46514) probably from that locality.

ADELPHICOS QUADRIVIRGATUS VISONINUS (Cope)

Adelphicos quadrivirgatus visoninus SMITH, Proc. Rochester Acad. Sci., vol. 8, pp. 186-188, figs. 2, 6 (map), 1942.

A single specimen (No. 109706) was found near Palenque, Chiapas, in a rotten log.

The Museum has no others from Mexico.

***AGKISTRODON BILINEATUS Günther**

The Museum has seven specimens, from María Madre Island, Tres Mariás Islands (No. 24685)²; Tehuantepec, Oaxaca (No. 30492); Los Reyes, Michoacán (No. 46416); and "Mexico" (Nos. 32214, 84055, 85093-4).

¹ Smith, 1942c, pp. 192-195, figs. 4 (ventral head scales), 6 (map).

² Stejneger, 1899, p. 71.

AMASTRIDIDIUM SAPPERI (Werner)

One specimen (No. 110334) is from Las Nubes, Cerro Ovando, Chiapas (2,500 feet). Ventrals 165; anal divided; caudals 70+ a few; female; 7 supralabials, third and fourth entering eye, fourth and fifth narrowly in contact with parietal; loreal and preocular fused, but outlines clearly indicating two scales; one postocular. Light area on posterior part of head reddish.

The specimen was found hidden in gravel through (not over) which water trickled, among boulders in a stream on a steep slope.

The Museum has one other (No. 46509),³ from Chicharras, Chiapas.

**ARIZONA ELEGANS OCCIDENTALIS* Blanchard

The Museum has two Mexican specimens, one (No. 14298)⁴ from "Chihuahua" and the other (No. 46374) from Casas Grandes, Chihuahua.

BOTHROPS ATROX ASPER (Garman)

Six specimens were collected, all from the state of Chiapas: Palenque (No. 110430); Javarinero (No. 110431); La Esperanza, near Escuintla (Nos. 110432-3, HMS Nos. 15627, 16904). All are females, with 210 to 219 ventrals and 61 to 67 caudals.

The Museum has 15 other Mexican specimens: Chicharras, Chiapas (No. 46602); mountains near Santo Domingo, Oaxaca (Nos. 47931-2); Teapa, Tabasco (Nos. 46406, 46595); Mirador, Veracruz (Nos. 25046-9)⁵; Orizaba, Veracruz (No. 30220); San Rafael, Veracruz (No. 32149); Tuxpan, Veracruz (No. 25212); "Mexico" (Nos. 6372, 30243-4).

**BOTHROPS BARBOURI* (Dunn)

The Museum has a single specimen, the type (No. 46347), from Omilteme, Guerrero.⁶

**BOTHROPS BICOLOR* Bocourt

The Museum has a single specimen (No. 46511), from Chicharras, Chiapas.⁷

BOTHROPS DUNNI (Hartweg and Oliver)

Eleven specimens were obtained, all from the general vicinity of Tehuantepec, Oaxaca: Mount Guengola (Nos. 110416-7, HMS No. 11750); Tres Cruces (Nos. 110418-20); Cerro de Huamelula (No.

³ Dunn, 1924, p. 1.

⁴ Blanchard, 1924, pp. 1-5.

⁵ Cope, 1861, p. 295.

⁶ Dunn, 1919, pp. 213-214; Smith, 1941g, p. 62.

⁷ Smith, 1941g, pp. 61-62.

110461); Cajón de Piedra (No. 110422); Tehuantepec (Nos. 110423-4); and Río Grande, 12 miles north of Niltpec (No. 110425).

Scale rows 23-23-19, except in one with 25-25-21 rows; ventrals 143 to 153 in five males, 147 to 155 in six females; caudals 36 to 42 in five males, 32 to 37 in six females; supralabials 9-9 in one, 9-10 in four, 10-10 in four, 10-11 in two; infralabials 10-10 in three, 10-11 in two, 11-11 in four, 11-12 in one, 12-12 in one; preoculars 3-3 except in one which has 4-4; suboculars 1-1 except in one which has 2-2; postoculars 2-2 to 3-4; bands on body 14 to 19.

The Museum has six others,⁸ one from Puerto Ángel (No. 46422), five from Tehuantepec, Oaxaca (Nos. 30266-70).

BOTHROPS MELANURUS (Müller)

Trimeresurus garciai SMITH, Proc. Biol. Soc. Washington, vol. 53, pp. 55-64, 1940.

One specimen, a paratype of *garciai* (No. 108602), is from Cacaolapam, Puebla.

The Museum has no others of the species.

BOTHROPS MEXICANUS (Duméril and Bibron)

Five specimens are in the collection, four (Nos. 110426-8, HMS. No. 7654) from Piedras Negras, Guatemala, and one (No. 110429) from Santa Rosa, near Comitán, Chiapas.

The Museum has no others of the species from Mexico.

The most conspicuous difference between *mexicanus* and *nummifer* in pattern is the shape and lateral extent of the dorsal blotches. In the former the blotches are large, dark brown rhombs that extend laterally to the tenth or as far as the sixth scale row. Sometimes these rhombs are black-edged. Opposite the lateral corner on each side is a short, black or dark brown transverse bar, sometimes reaching nearly to the ventrals. Usually, except on the anterior third of the body, the lateral bars are fused with the dorsal spots. Frequently, over all or a part of the body, the dorsal blotches are fused in pairs, producing a broad cross band; the lateral spots remain distinct from one another. The bands or rhombs may be somewhat staggered by displacement on the midline. In *nummifer* the pattern is of much the same character, except that the dorsal blotches tend to be less angular and more rounded, all are black-edged, and do not fuse with the lateral spots. The median blotches may be staggered and so fused with one another as to produce a rather broad, zigzag median band (such a variation does not occur in *mexicanus*), but they do not fuse in pairs as they frequently do in *mexicanus*.

⁸ Amaral, 1929b, p. 22.

Each species has about the same number of lateral spots; in *nummifer* the dorsal blotches are always of about the same number as the lateral spots; but in *mexicanus* the number may be reduced to as few as 10 or 11 by fusion of pairs of blotches.

Other pattern differences involve the tail and head. In *mexicanus* the tail tip is very light (yellowish) in young specimens, and it remains light until a size of at least 500 mm. is reached; specimens of greater size than this may develop dark color at the tip of the tail or may retain a light color. In *nummifer* the tail tip may be slightly lighter than the base, but it is well pigmented in even the youngest specimens; never is it distinctly light as in *mexicanus*. In adult *nummifer* the tail may remain dark or become rather light at the tip.

The position of the postocular dark stripe is generally diagnostic. In *mexicanus* it continues straight back from the eye, parallel to the lip, for about one-third its length; it then dips ventrally and reaches the level of the mouth just posterior to the rictus oris, terminating three or four scales posterior to that point; it usually involves only the posterior edge of the last scale in the lower row of temporals and never involves more than the last two scales. In *nummifer* the stripe passes almost in a straight line diagonally toward the angle of the mouth, thus almost always involving at least two, and usually three and sometimes four, of the scales in the lower row of temporals.

There are apparently no differences in ventral pattern.

In scutellation there is a difference in number of scale rows, which is 23 to 27 (one 23 in 6) anteriorly and 25 to 27 medially in *mexicanus*, but 21 to 25 anteriorly (one 25 in 13) and 23 to 25 medially (one 25 in 15) in *nummifer*. Ventrals in two male *mexicanus* are 124 to 127, in eight male *nummifer* 129 to 134; in four female *mexicanus* they are 127 to 131, in six female *nummifer* 120 to 134. Caudals in two male *mexicanus* are 32 to 36, in nine male *nummifer* 30 to 36; in four female *mexicanus* they are 31 to 35, in six female *nummifer* 23 to 30. Thus differences are apparent between the two forms in the ventrals of males and the caudals of females. In *mexicanus* the supralabials average somewhat more numerous, 9 seldom occurring (1 in 12 counts), and 11 frequently occurring (5 in 12 counts), while in *nummifer* 8 or 9 frequently occur (19 in 30 counts) and 11 not at all. In *mexicanus* the nasal is completely separated from the rostral by three small scales, while in *nummifer* it contacts the rostral, and the row of small scales is reduced to two, one, or none. The temporal scales of the lower row are somewhat smaller in *mexicanus* than in *nummifer*. In *mexicanus* the lower preocular is very poorly differentiated and does not enter the orbit; in *nummifer* it enters the orbit below the much larger upper preocular and is rather well defined.

The vertebral ridge is more accentuated in the southern form, although dissections of the neural spines of the anterior vertebrae show no noticeable differences. The keels of the median scale rows anteriorly are markedly different, however, as those of *mexicanus* terminate in an enlarged knob near the posterior tip of the scale, while those of *nummifer* reach the extreme tip; in the latter the knob is present but less distinct.

A large *nummifer* (female) measures 573 mm. in total length; somewhat shorter than this are other females with well-developed young. The larger male *nummifer* measures 567 mm. Apparently this species is notably smaller than *mexicanus*, one specimen (female) of which has been seen that measures 934 mm. in total length. The southern species probably reaches a maximum length of about 1,100 mm.

The southern form is distinctly shorter in proportion to body diameter, and the head is somewhat larger; these have long been known as characteristic features of the "jumping viper" (*mexicanus*). In *nummifer*, however, the head and body are of more nearly normal proportions. The differences are not of a type that may well be treated statistically.

It appears obvious that these two forms are distinct from each other yet closely related. Whether they are separate species or are subspecies is not clearly evident from data now available; certainly they are members of a single morphologic group and have complementary ranges, but this does not necessarily mean that an intergradation takes place. Since all specimens can readily be differentiated, and there is no overlap of variation in certain features differentiating them, it seems best to consider the two forms as distinct species.

TABLE 1.—*Variation in Bothrops mexicanus*

U.S.N.M. No.	Sex	Nasorostral scales	Tail tip	Scale rows	Ventrals	Caudals	Supralabials	Infralabials	Dorsal body spots	Lateral body spots	Total length	Tail length
											<i>Mm.</i>	<i>Mm.</i>
110426	♂	3-3	Light.....	23-25-19	124	32	10-10	12-12	19	21	266	31
110427	♂	3-3	Light.....	25-25-21	127	36	9-10	12-12	16	23	313	40
110428	♀	3-3	Lightish.....	27-27-19	127	31	11-11	13-?	20	23	934	84
110429	♀	3-3	Black.....	25-25-19	129	33	11-11	11-13	21	19	583	57

BOTHROPS NASUTUS Bocourt

Trimeresunus nasutus SMITH, Zoologica, vol. 26, p. 62, 1941.

One specimen was secured at Piedras Negras, Guatemala (No. 110415). It was found sunning itself among the loose rocks of the

ruins of one of the Mayan buildings. Scale rows 23-23-19; ventrals 145; caudals 30; supralabials 9-9; infralabials 11-11; two preoculars (or three, but the middle very minute, not reaching orbit); three suboculars; two postoculars; 17 bands on body; female.

The Museum has no other northern specimens of the species.

***BOTHROPS NUMMIFER (Rüppell)**

The Museum has eight specimens, from Mirador (No. 6371) and Orizaba (Nos. 61993-7), Veracruz, and "Veracruz" (Nos. 25044-5). Other specimens examined are from Zacualtipan, Hidalgo (A.N.S.P. No. 14768), and Necaxa, Puebla (U.M.M.Z. 63942); five bear no locality (A.N.S.P. 7245-9).

TABLE 2.—*Variation in Bothrops nummifer*

Museum No.	Sex	Nasorostral scales	Tail tip	Scalerows	Ventrals	Caudals	Supralabials	Infralabials	Dorsal body spots	Lateral body spots	Total length	Tail length
											<i>Mm.</i>	<i>Mm.</i>
U.S.N.M. No. 6371	♀	2-2	Black	23-24-19	129	30	10-10	11-11	23	23	553	59
A.N.S.P. No. 7245	♀	-----	Black	23-24-20	131	27	9-9	12-13	23	23	573	54
A.N.S.P. No. 7247	♀	-----	Black	?-24-?	134	26+	10-10	11-12	-----	-----	-----	-----
A.N.S.P. No. 14768	♀	-----	Black	23-23-19	127	29	10-10	11-11	25	25	462	46
U.S.N.M. No. 25045	♀	0-0	Light	25-25-20	133	23	8-9	11-11	23	24	516	45
U. M. M. Z. No. 63942	♀	-----	Black	23-23-19	120	29	9-10	11-11	20	21	190	25
U.S.N.M. No. 25044	♂	1-0	Dark	?-23-19	-----	33	9-9	12-12	-----	-----	98	98
U.S.N.M. No. 61995	♂	2-2	Dark brown	23-24-19	130	33	9-10	11-12	21	22	170	23
U.S.N.M. No. 61996	♂	2-2	Dark brown	23-23-19	131	34	9-10	10-10	22	21	176	26
U.S.N.M. No. 61993	♂	2-2	Dark brown	23-23-19	134	35	9-10	10-11	-----	22	187	27
U.S.N.M. No. 61994	♂	2-2	Dark brown	23-23-19	132	33	9-9	11-11	20	22	169	24
U.S.N.M. No. 61997	♂	2-2	Dark brown	23-23-19	131	35	9-9	11-11	-----	24	170	25
A.N.S.P. No. 7249	♂	-----	Black	21-23-17	129	30	9-9	10-11	22	22	561	65
A.N.S.P. No. 7248	♂	-----	Black	23-23-19	132	34	8-9	12-12	23	23	-----	-----
A.N.S.P. No. 7246	♂	-----	Black	23-23-19	133	36	9-10	11-12	20	20	-----	-----

***BOTHROPS UNDULATUS (Jan)**

The Museum has five specimens, from Orizaba, Veracruz (No. 6319), Omilteme, Guerrero (Nos. 46345-6, 46348), and Oaxaca, Oaxaca (No. 46466).

***BOTHROPS YUCATANICUS (Smith)**

The Museum has a single specimen, the type (No. 46571), from Chichen Itzá, Yucatán.⁹

⁹ Smith, 1941g, pp. 62-63.

CHERSODROMUS LIEBMANNI Reinhardt

Twenty specimens were secured, all at Cuautlapan, Veracruz (Nos. 109915-34). They were found under fallen banana trunks and other debris in banana patches.

Supralabials 6-7 in one, 7-7 in nineteen; infralabials 6-6 in two, 7-7 in four, 7-8 in six, 8-8 in eight; no preoculars, a postocular on one side in two, on both sides in five (sometimes very small), no postocular (i. e., fused with supraocular) in twelve, no postocular but temporal broadly in contact with eye in one. The belly is nearly or quite unspotted in some, nearly all black in others.

The Museum has two others, both from Orizaba, Veracruz (Nos. 6330, 7102).

TABLE 3.—*Variation in Chersodromus liebmanni*

U.S.N.M. No.	Sex	Ventrals	Caudals	U.S.N.M. No.	Sex	Ventrals	Caudals
109915	♀	132	35	109931	♀	135	35
109916	♀	142	33	109933	♀	134	35
109917	♀	132	33	109919	♂	128	39
109918	♀	134	32	109920	♂	129	39
109922	♀	138	37	109921	♂	129	37
109923	♀	139	35	109924	♂	127	38
109926	♀	134	37	109925	♂	124	38
109927	♀	142	32	109929	♂	127	40
109928	♀	135	37	109932	♂	129	43
109930	♀	131	33	109934	♂	129	41

CLELIA BAILEYI Smith

Clelia baileyi SMITH, Proc. U. S. Nat. Mus., vol. 92, pp. 391-393, 1942.

One specimen, the type (No. 111261), was secured at Potrero Viejo, Veracruz, by Dyfrig McH. Forbes.

The Museum has no others.

CLELIA CLELIA CLELIA (Daudin)

Six specimens are in the collection, one from Potrero Viejo, Veracruz (No. 111267), and five from various localities near Escuintla, Chiapas (Cruz de Piedra, Nos. 111262-3; La Esperanza, Nos. 111264-5; Las Gradass, No. 111266). Scale rows uniformly 17-17; ventrals 210, 217, 201, 220, 206, 206, respectively; caudals 82 ♂, ? ♀, 88 ♂, 76 ♀, 90 ♂, ? ♂; supralabials 7-7; infralabials 8-8; preoculars 1-1; postoculars 2-2; temporals 2-3 or 2-2.

The Museum has three other specimens, from San Juan Bautista (No. 6581, type of *Scolecophis scytalinus* Cope, 1866, p. 320), "Mexico" (No. 16388), and Tehuantepec (No. 32272, collected by Dr. Spear). These agree well with the others; all have the dorsal scales black-tipped.

*CLELIA CLELIA IMMACULATA Smith

The Museum has a single specimen, the type (No. 24966), from Guadalajara, Jalisco.¹⁰

*COLUBER CONSTRICTOR STEJNEGERIANUS (Cope)

The Museum has a single Mexican specimen, the type of *Zamenis conirostris* Cope (No. 1768), from Matamoros, Tamaulipas.¹¹

CONIOPHANES BIPUNCTATUS BISERIATUS Smith

Coniophanes bipunctatus biseriatus SMITH, Proc. Biol. Soc. Washington, vol. 53, pp. 59-60, 1940.

Four specimens (Nos. 108595, 109716-8) of the type series, as well as one embryo not included in the series (No. 109719), are from near Palenque, Chiapas. One other (No. 109715) is from Potrero Viejo, Veracruz, collected by Dyfrig McH. Forbes. The latter is a male, with 128 ventrals, the tail broken.

The type series was separated from *bipunctatus* (which was then considered as occurring in central Mexico as well as in Central America) largely on the basis of what appeared to be an exceptional pattern, with the inner edge of the lateral stripe scalloped, or two rows of spots enclosed between the two lateral stripes. Since this distinct pattern was not mentioned by Bailey (1939, pp. 24-26), it was considered a development restricted to specimens of this area. They were also compared with two large specimens from Tierra Colorada, Veracruz, which showed no evidence of the pattern characteristic of the Palenque specimens.

However, an examination of the Mexican specimens¹² of *bipunctatus* in the National Museum (including No. 30326, Orizaba, and No. 30343, Tehuantepec) shows that the peculiar pattern described is characteristic of the young and is still visible even in the Potrero specimen, which measures 357 mm. in body length. Accordingly, it cannot be held that the Palenque specimens are any different from other Mexican specimens now known.

¹⁰ Smith, 1942g, p. 394.

¹¹ Cope, 1895, p. 679.

¹² Bailey, 1939, p. 26.

The whole Mexican population is, however, different from the Central American specimens, in two characters: Ventral counts and pattern of the young and subadults. Young *bipunctatus* from British Honduras in the Field Museum, recently examined, are not spotted and do not have scalloped inner edges of the lateral stripes as in Mexican specimens; thus their separate identity is certain. The stripes are more distinct in Central American specimens.

CONIOPHANES FISSIDENS FISSIDENS (Günther)

Coniophanes fissidens fissidens SMITH, Proc. U. S. Nat. Mus., vol. 91, p. 104, 1941.

Four specimens were secured, all at Piedras Negras, Guatemala (Nos. 109720-2; HMS 7353). The ventral and caudal counts, respectively, of these in the order given are: 127, 71 (♀); 123, 75 (♂); 128, ? (♀); 127, 70 (♀). Scale rows 21-21-17; supralabials 8-8; infralabials 10-10; preoculars 1-1; postoculars 2-2 in all. A distinct, regular row of moderately large spots is present on each side of the belly.

The Museum has two other Mexican specimens,¹³ from Teapa, Tabasco (No. 46590), and San Andrés Tuxtla, Veracruz (No. 46389). The last is somewhat intermediate between *f. fissidens* and *f. proterops*.

CONIOPHANES FISSIDENS PROTEROPS Cope

Coniophanes fissidens proterops SMITH, Proc. U. S. Nat. Mus., vol. 91, pp. 105-106, 1941.

Ten specimens were secured, from the following localities: Tequeyutepec, Veracruz (Nos. 109769-73); Potrero Viejo, Veracruz (Nos. 109767-8); Cuautlapan, Veracruz (Nos. 109764-6). The Tequeyutepec specimens were found under stones on grassy slopes of the mountainous area west of Jalapa, after a period of rains in the middle of the dry season.

The Museum has 10 other specimens (see Smith, *loc. cit.*).

CONIOPHANES FISSIDENS PUNCTIGULARIS Cope

Coniophanes fissidens punctigularis SMITH, Proc. U. S. Nat. Mus., vol. 91, pp. 107-109, map fig. 33, 1941.

Forty-five specimens, all from the vicinity of Escuintla, Chiapas, are in the collections: Finca Juárez (Nos. 109723-5); Salto de Agua (Nos. 109726-7); Cruz de Piedra (Nos. 109728-35); La Esperanza (Nos. 109736-63, HMS Nos. 16556, 17053, 17162, 17279). Some were found during the day in rotten logs, but by far the greater part was found at night along trails through forest or coffee groves.

The Museum has five other specimens (see Smith, *loc. cit.*).

¹³ Smith, 1941s, p. 104.

**CONIOPHANES IMPERIALIS IMPERIALIS* (Kennicott)

The Museum has two specimens, the type (No. 2060)¹⁴ from Matamoros, Tamaulipas, and one (No. 25204) from Tuxpan, Veracruz.

CONIOPHANES IMPERIALIS CLAVATUS (Peters)

Twelve specimens are in the collection, as follows: Potrero Viejo, Veracruz (Nos. 109774–82); Tenosique, Tabasco (Nos. 109783–4); Palenque, Chiapas (No. 109785).

The scutellation of the series is fairly uniform. All have one preocular, two postoculars, and eight supralabials; the infralabials are 9–9 in eight, 9–10 in one, 10–10 in two, 10–11 in one; ventral and caudal counts are given in table 4.

TABLE 4.—*Variation in Coniophanes imperialis clavatus*

U.S.N.M. No.	Sex	Ventrals ¹	Caudals	Scale rows	U.S.N.M. No.	Sex	Ventrals	Caudals	Scale rows
109774	♂	127	-----	19–17	109780	♂	127	83	19–15
109775	♂	124	-----	19–15	109781	♂	124	80	19–15
109776	♂	124	-----	19–15	109782	♂	124	-----	19–16
109777	♂	127	82	19–15	109783	♀	131	79	19–17
109778	♂	126	79	19–15	109784	♀	129	78	19–15
109779	♂	118	77	19–15	109785	♀	129	80	19–15

The variation in coloration is considerable and regional. The Potrero specimens have a short temporal stripe, not reaching the end of the parietals (in one it comes very near); the dorsolateral stripes are not broken on the nape; and the middorsal stripe is about one scale wide in five, much less in three. The Palenque and Tenosique specimens agree with each other and differ from the Potrero specimens in having a longer temporal stripe (reaching end or very near end of parietals) and the dorsolateral stripes broken at the nape, leaving a round, nuchal spot on each side. The middorsal stripe in the Palenque specimen is very narrow, while in the Tenosique specimens it is broader but has a spotted appearance, as described by Bailey (1939, pp. 36, 37).

The Potrero specimens differ from the others also in having what appears to be a distinctly smaller, narrower head.

The Potrero specimens were found under stones; the one from Palenque was found under a rotten log; and the two Tenosique specimens were found at night along a cart road, shortly after a heavy rainstorm.

The Museum has one other, from Orizaba, Veracruz (No. 12123).

¹⁴ Baird and Girard, in Baird, 1859, p. 23, pl. 19, fig. 1.

CONIOPHANES IMPERIALIS COPEI Hartweg and Oliver

Twenty-one specimens were collected (Nos. 109786-99, 109800-3; HMS Nos. 12628, 12829-30), all in the vicinity of Tehuantepec, Oaxaca.

The supralabials are 8-8 in all; infralabials 10-10 in two, 9-10 in two, 9-9 in 17; there are two preoculars on both sides in one, on one side in another. Variation in ventral and caudal counts is shown in the accompanying table.

TABLE 5.—*Variation in Coniophanes imperialis copei*

No.	Sex	Scale rows	Ventrals	Caudals
HMS No. 12628-----	♀	19-15	136	69+?
U.S.N.M. No. 109786-----	♀	19-17	137	70
U.S.N.M. No. 109788-----	♀	19-17	133	72
U.S.N.M. No. 109794-----	♀	19-15	135	-----
U.S.N.M. No. 109796-----	♀	19-15	136	68
HMS No. 12829-----	♂	19-16	130	67+?
HMS No. 12830-----	♂	19-17	134	74
U.S.N.M. No. 109787-----	♂	19-15	129	76
U.S.N.M. No. 109789-----	♂	19-16	132	80
U.S.N.M. No. 109790-----	♂	19-17	132	75
U.S.N.M. No. 109791-----	♂	19-15	132	-----
U.S.N.M. No. 109792-----	♂	19-15	131	-----
U.S.N.M. No. 109795-----	♂	19-17	131	76
U.S.N.M. No. 109797-----	♂	19-15	133	-----
U.S.N.M. No. 109798-----	♂	19-15	127	70
U.S.N.M. No. 109799-----	♂	19-17	127	74
U.S.N.M. No. 109800-----	♂	19-15	130	74
U.S.N.M. No. 109801-----	♂	19-16	134	82
U.S.N.M. No. 109802-----	♂	19-17	136	69
U.S.N.M. No. 109803-----	♂	19-15	130	70
U.S.N.M. No. 109793-----	♂	19-15	131	74

The dorsolateral stripes are separate from the white, lateral nuchal spots in all; the sides of the body are much lighter on the outer scale rows (first and second) than on the third and fourth scale rows, both anteriorly and posteriorly. The width of the median stripe varies, but in all it is about one scale width anteriorly, less in the middle and posterior parts of the body.

The difference between the character of the lateral stripes in *copei* and *clavatus* is most apparent on the posterior part of the body, for anteriorly *clavatus* as well as *copei* has the lower half of the stripe much lighter than the upper half. Posteriorly the stripe is uniform black (or dark brown) in *clavatus*.

The specimens were most frequently found in piles of rotting debris in banana patches.

The Museum has one other specimen (No. 30299), from Tehuantepec.

CONIOPHANES PICEIVITTIS Cope

Two small females (Nos. 109804, 109805) were collected in the vicinity of Tehuantepec, Oaxaca. One of these (No. 109805) was found by army ants, routed from the leaves where it attempted to hide and brush off the ants, and eventually the snake wriggled off the edge of a bank into our camp site beside a stream.

Scutellation of head typical, except lower labials 9-9 in one. Ventrals 172, 173, respectively; caudals 83, 86. Scale rows 23-25-19 in both.

The Museum has two others, the cotypes (Nos. 30264-5)¹⁵ from Chihuitán, Oaxaca.

CONIOPHANES QUINQUEVITTATUS (Duméril and Bibron)

One specimen (No. 109806) was presented to me by Dr. Manuel Maldonado K., of the Instituto Politécnico de México. It was collected by Dr. Alfonse Dampf. The locality data are lost. Male, ventrals 153, tail incomplete.

The Museum has one other, from "Coatzacoalcos River, Veracruz" (No. 61182),¹⁶ the type of *Hydrops lubricus* Cope (1871, p. 217).

CONOPHIS LINEATUS LINEATUS (Duméril and Bibron)

Conophis lineatus lineatus SMITH, Journ. Washington Acad. Sci., vol. 31, p. 122, 1941.

A single specimen in the collection (No. 109708), secured by Dyfrigg McH. Forbes, was taken at Paso del Macho, Veracruz. It is a female with 166 ventrals, 55+? caudals, 19-19-17 scale rows, 8-8 supralabials, 10-10 infralabials, 1-1 preoculars, 2-2 postoculars, and 2-2 temporals. The pattern has previously been described. Another specimen (C. A. S. 73640) from Veracruz, Veracruz, has a pattern exactly as the former, and is similar in scutellation; the ventrals are 167, the caudals 70(♂).

The Museum has no others.

***CONOPHIS LINEATUS CONCOLOR Cope**

The Museum has three specimens, one from Chichen Itzá, Yucatán (No. 46395), and the two cotypes from "Yucatán" (No. 12368).¹⁷

¹⁵ Cope, 1869, p. 149; Bailey, 1939, p. 31.

¹⁶ Bailey, 1939, p. 28.

¹⁷ Cope, 1867b, p. 318.

CONOPHIS PULCHER SIMILIS Bocourt

Conophis pulcher plagosus SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 121-122, 1941.

Conophis pulcher similis SMITH, Proc. U. S. Nat. Mus., vol. 92, p. 395, 1942.

The type of *plagosus* (No. 109707) was found near Tonalá, Chiapas, moving about very slowly, during the day, at the base of a large bush the outer branches of which well shaded the area where the snake was lying.

The Museum has no others.

*CONOPHIS VITTATUS VITTATUS Peters

Five specimens are in the Museum, including No. 29123,¹⁸ from Guadalajara, Jalisco, and Nos. 31394-7, from Colima.

CONOPHIS VITTATUS VIDUUS Cope

Conophis vittatus viduus SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 120-121, 1941.

Seven specimens were secured in the vicinity of Tehuantepec, Oaxaca (Nos. 109709-14; IIMS No. 12100). Supralabials 7-7 in all; infralabials 8-9 in three, 9-9 in two, 9-10 in two; preoculars 1-1 in all; postoculars 2-3 in one, 2-2 in the remainder; two primary temporals in all, two to four secondary temporals; scale rows 19-19-17 in all.

The Museum has two others, both from "Tehuantepec"¹⁹ (No. 30259, type of *viduus*, and No. 30258, cotype of *sumichrasti*).

TABLE 6.—Variation in *Conophis vittatus viduus*

No.	Sex	Ventrals	Caudals
U.S.N.M. No. 109711-----	♂	157	66
U.S.N.M. No. 109712-----	♂	156	67
U.S.N.M. No. 109714-----	♂	164	68
U.S.N.M. No. 109709-----	♀	164	57
HMS No. 12100-----	♀	166	65
U.S.N.M. No. 109710-----	♀	175	57
U.S.N.M. No. 109713-----	♀	167	57

CONOPSIS NASUS Günther

Conopsis nasus TAYLOR and SMITH, Univ. Kansas Sci. Bull., vol. 28, pp. 329-332, 1942.

Eight specimens were secured, three at Guanajuato, Guanajuato (Nos. 110663-5), one 10 miles east of Morelia, Michoacán (No.

¹⁸ Lectoholotype cotype of *Conophis sumichrasti sumichrasti* Cope, 1876, p. 137.

¹⁹ Cope, 1876, p. 137.

110670), and four at Tacécuaro, Michoacán (Nos. 110666-9). The internasals are lacking in all. All have 7-7 supralabials, 6-6 infralabials, 1-1 preoculars, 2-2 postoculars, and 1-2 temporals; the posterior chin shields are in contact medially in 4, separated in 4; each of these have a single undivided subcaudal scale; the prefrontals contact the labials on one side of one, on both sides of another. Other details are given in table 7.

TABLE 7.—*Variation in Conopsis nasus*

U.S.N.M. No.	Sex	Ventrals	Caudals	Loreal	Total length	Tail length
					<i>Mm.</i>	<i>Mm.</i>
110665	♀	131	29	0-0	263	37
110663	♂	122	34	1-1	119	19
110664	♂	123	37	1-1	273	46
110666	♂	127	32	0-0	311	48
110667	♂	129	32	0-0	280	43
110668	♂	131	35+	0-0	375+	55+
110669	♂	128	36	0-0	257	44
110670	♂	123	35	0-1	275	49

CONSTRUCTOR CONSTRUCTOR IMPERATOR (Daudin)

Thirty-two specimens were secured, as follows: CHIAPAS: Palenque (Nos. 111285-6); Acacoyagua (No. 111288); La Esperanza, near Escuintla (No. 111287). OAXACA: Cerro Arenal (No. 111289); Coyul (No. 111293); Salina Cruz (Nos. 111294-311); Tehuantepec (Nos. 111290-2). VERACRUZ: Matcabresto (Nos. 111280-2); Potrero Viejo (Nos. 111283-4).

The Museum has 23 other Mexican specimens, as follows: CHIAPAS: Huehuetán (No. 46477). COLIMA: Colima (Nos. 62024, 62074, 63846-8); Manzanillo (No. 46608). GUERRERO: Zacatula River, near Lauria (No. 63851). MICHOACÁN: Neshia River, Sierra Madre (No. 62025); Chacan River, Sierra Madre (Nos. 62073, 63849-50); Plains of Nuroapa, Huroha Volcano (No. 63852). OAXACA: Tehuantepec (Nos. 30420-1). SINALOA: Sierra de Choix (No. 46503). SONORA (No. 61956). VERACRUZ: Mirador (Nos. 6404, 6582); Córdoba (No. 30520); Santa María (No. 46561). YUCATÁN (No. 11380): Chichen Itzá (No. 46394). I have also examined three others from Chichen Itzá, Yucatán, in the Field Museum of Natural History (Nos. 26990-2).

A total of 41 specimens from all localities represented in the above series have been counted, and the number of media rows was

found to vary from 65 to 79. The fact that these specimens represent practically all extremes of the range of *Constrictor* in Mexico,

TABLE 8.—*Variation in Constrictor constrictor imperator*

Museum No.	Sex	Scale rows	Ventrals	Caudals	Supra-labials	Infra-labials
U. S. N. M. No. 6404---	♀	53-69-35	244	61	19-20	21-22
U. S. N. M. No. 6582---	♀	55-69-37	249	54+	20-20	22-22
U. S. N. M. No. 11380--	♀	59-79-41	242	59+	21-?	24-?
U. S. N. M. No. 30420 ¹ --	♀	55-?-?	-----	-----	18-19	22-22
U. S. N. M. No. 30421--	♀	51-75-39	246	54+	19-19	23-23
U. S. N. M. No. 46561--	♀	49-65-35	239	-----	18-21	22-24
U. S. N. M. No. 61956--	♀	55-75-39	246	59	21-21	24-25
U. S. N. M. No. 63846--	♀	59-79-39	241	58	21-22	21-24
U. S. N. M. No. 63851--	♀	59-75-39	238	54+	23-?	23-?
U. S. N. M. No. 63852--	♀	61-79-41	-----	53	20-21	22-?
U. S. N. M. No. 111280--	♀	51-66-34	235	53	18-?	21-?
U. S. N. M. No. 111286--	♀	54-69-36	242	55	19-20	22-23
U. S. N. M. No. 111287--	♀	57-67-35	250	58	18-19	22-23
U. S. N. M. No. 111288--	♀	59-69-39	239	48	20-21	24-24
U. S. N. M. No. 111289--	♀	72-39	249	53	20-19	25-22
U. S. N. M. No. 111290--	♀	53-71-37	253	57	20-20	22-24
U. S. N. M. No. 111291--	♀	61-75-39	-----	56	19-21	25-25
U. S. N. M. No. 111292--	♀	57-71-37	249	52	20-21	23-23
U. S. N. M. No. 111293--	♀	57-73-40	253	54	20-20	24-23
U. S. N. M. No. 111311--	♀	55-71-41	247	49+	18-18	21-23
F. M. N. H. No. 26991--	♀	59-75-41	240	55	19-20	23-24
U. S. N. M. No. 30520--	♂	51-73-37	245	56	22-22	24-25
U. S. N. M. No. 46394--	♂	57-75-39	245	70	21-22	26-26
U. S. N. M. No. 46177--	♂	57-69-41	² 242	-----	19-20	23-23
U. S. N. M. No. 46503--	♂	59-73-37	241	58	21-21	23-24
U. S. N. M. No. 46608--	♂	63-79-39	243	63	20-21	23-24
U. S. N. M. No. 62024--	♂	59-75-39	247	58+	21-?	22-?
U. S. N. M. No. 62025--	♂	61-75-37	241	65	20-20	22-23
U. S. N. M. No. 62073--	♂	57-75-41	238	65+	19-19	25-?
U. S. N. M. No. 62074--	♂	55-69-41	234	65+?	21-19	23-23
U. S. N. M. No. 63847--	♂	59-75-39	247	61	19-20	21-23
U. S. N. M. No. 63848--	♂	57-77-41	243	67	20-22	24-?
U. S. N. M. No. 63849--	♂	55-69-35	243	64	-----	21-21
U. S. N. M. No. 63850--	♂	57-71-39	246	64	20-21	24-24
U. S. N. M. No. 111281 ¹ --	?	-----	-----	-----	18-19	21-21
U. S. N. M. No. 111282 ² ³ --	♂	-----	-----	60	19-21	23-23
U. S. N. M. No. 111283--	♂	50-67-34	231	58	17-17	20-21
U. S. N. M. No. 111284--	♂	53-67-35	235	57	19-20	22-22
U. S. N. M. No. 111285--	♂	56-74-37	242	65	20-21	23-24
F. M. N. " " " " " "	♂	59-75-41	236	62	21-20	24-24
F. M. N. " " " " " "	♂	59-73-43	244	62	20-21	23-24

¹ Head only.² Anal area anal divided.³ Middle eye.

justifies, I believe, the assumption that Jan's *mexicana* (Jan, 1863, p. 23; supposedly with 55 scale rows) either does not occur in Mexico or else was improperly counted. The low counts given by Andrews (1937, p. 356) are not correct; he cites them as 56 to 62 in four specimens, but a recheck of three (Nos. 26990-2) of the same specimens (the fourth could not be found) yielded maximum counts of 73 to 75. Since little has been recorded of the variation in this species, table 8 is of interest.

It appears that *C. c. imperator* does not reach the large size of its southern relative, *c. constrictor*. I have never seen a specimen in the field that would exceed perhaps 7 feet in total length, and the largest measured specimen is a dried, stretched skin of about 2,420 mm. in total length (7.9 feet).

The only apparent geographic correlation of the variation recorded in Mexican *Constrictor* is an increase in number of ventral scales on María Madre Island. The three known specimens have counts higher than any from the rest of Mexico, and accordingly they may be considered to represent a recognizably different race, which may be called

***CONSTRUCTOR CONSTRUCTOR SIGMA, new subspecies**

Holotype.—U.S.N.M. No. 46484, collected by Nelson and Goldman on María Madre Island, Tres Mariás Islands, May 12, 1897.

Paratypes.—Two, including U.S.N.M. No. 24672, collected with the preceding, and Calif. Acad. Sci. No. 58681, collected by Joseph R. Slevin at the type locality on May 21, 1925.

Diagnosis.—Like *Constrictor constrictor imperator*, but ventrals more numerous, 258 to 259 as compared with the range of 225 to 253 in mainland specimens.

Description of holotype.—Alcoholic skin of an adult female, estimated length about 200 cm., tail and head intact. Scale rows 59-77-39; ventrals 259; 55 subcaudals, a few near tip probably missing; five subcaudals divided, others entire; 20-20 supralabials, 23-23 infralabials.

Color as typical of the species, markings rather indistinct. Preocular dark stripe very short, not so long as eye; postocular dark stripe very narrow for a short distance behind eye (a little less than length of eye), then abruptly expanding; lower edge of stripe distinct, upper poorly defined; lower edge of stripe passes through rictus oris. No other marks on head, except for two large spots in the infralabial region on each side. Belly with rather small, black spots, scattered along edges of ventrals.

Variation.—Nos. 24672 and 58681 have, respectively, 258 and 258 ventrals, 57-77-41 and ?-77-? scale rows, 65 and 66 subcaudals, 22-22 and 19-20 supralabials, 24-? and 23-24 infralabials. Both are males.

Remarks.—For comparison with *sigma* I have had available not only the counts given in table 8 for *imperator*, but also 26 others given by Allen, 1933, p. 11; Bocourt, 1882, pp. 519–521; Boulenger, 1893, p. 119; Brown, 1893, p. 429; Gaige, 1936, p. 298; Hartweg and Oliver, 1940, p. 19; Oliver, 1937, p. 19; and Ruthven, 1912, pp. 323–324. With one exception, all these counts are less than 253, my maximum; this exception is a count of 261 on a specimen from Tehuantepec. This seems aberrant, since it is 9 higher than the 61 other counts available, but in any case there is no doubt that at least an average difference exists between the Tres Mariás specimens and those from the mainland. Exclusive of the single aberrant count, those from the mainland vary from 225 (Boulenger) to 253, with an average of 241.6 and an interquartile range of 235 to 249.

CROTALUS ATROX Baird and Girard

Eleven specimens were secured, as follows: CHIHUAHUA: 7 miles west of Carrizal (No. 104614); 4 miles south of Ascención (No. 104625); Río Santa María, near Progreso (Nos. 104619–20, 104622–4). NUEVO LEÓN: 20 km. south of Sabinas Hidalgo (HMS No. 11530). TAMAULIPAS: Hacienda La Clementina, 4 miles west of Forlón (No. 110607); 20 to 26 km. south of Nuevo Laredo (Nos. 110608–9).

The Museum has 14 other Mexican specimens, from CHIHUAHUA: "Chihuahua" (Nos. 14280, 36995); Lake Santa María (Nos. 46475, 46596); Santa Cruz (No. 263). NUEVO LEÓN (No. 1302). SAN LUIS POTOSÍ (No. 46474). SONORA: Camoa (Nos. 46378–9); San Bernardino (Nos. 21045–6); Colorado River 10 miles south of United States-Mexican border (Nos. 21824–5). TAMAULIPAS: Soto La Marina (No. 37577).

*CROTALUS BASILISCUS (Cope)

The Museum has three specimens, including the type (No. 53586)²⁰ from Colima, one (No. 46468)²¹ from Yaganiza, San Pablo, Oaxaca, and one (No. 46467)²¹ from Oaxaca, Oaxaca.

CROTALUS DURISSUS DURISSUS Linnaeus

Five specimens are from La Esperanza, Chiapas (near Escuintla) (Nos. 110613–4); Xochicalco, Morelos (No. 110610); Las Vacas, 24 km. from Tequexistlán, Oaxaca (No. 110612); Paso del Macho, Veracruz (No. 110611). The ventrals and caudals of these specimens, in the above order, are: 172. 32 (♂); 173. 29 (♂); 182. —(?) ; 182. 25 (♀); 174. 24 (♀). In the Oaxaca specimen the neck stripes are only as long as the head; they are followed after an interval of one scale length by a

²⁰ Cope, 1864, p. 166.

²¹ Gloyd, 1940, pp. 142–149, map 10, pl. 16, fig. 1.

short pair of stripes five scales long; after an interval of one (two on one side) scale length, follows another pair of stripes, these covering seven scale lengths; posterior to this the markings are blotchlike. In the other specimens the neck stripes are unbroken for a distance equal to about three or four times the length of the head. In one the posterior third of the stripes is expanded laterally somewhat, appearing blotchlike.

The Museum has nine other Mexican specimens, from CAMPECHE: Apazote (Nos. 46399–46400). OAXACA: Tehuantepec (No. 30260); Huilotepec (No. 46473). TABASCO: Montecristo (Emiliano Zapata) (No. 46522). YUCATÁN: Chichen Itzá (No. 46570); "Yucatán" (No. 6557[2]). LOCALITY UNKNOWN: No. 12716, "City of Mexico," certainly incorrect.

***CROTALUS LEPIDUS KLAUBERI** Gloyd

Nine²² specimens of this race are in the Museum, as follows: CHIHUAHUA: Lake Santa María (Nos. 46597–8); "Chihuahua" (Nos. 36994, 56165). DURANGO: Guanacevi (No. 46349). JALISCO: Bolanos (No. 46472). ZACATECAS: Berriozabal (No. 46454); Plateado (Nos. 46470–1).

***CROTALUS MOLOSSUS MOLOSSUS** Baird and Girard

Four specimens are in the Museum, from Sierra Encarnación, Coahuila (No. 46507), Dist. Guerrero, Chihuahua, 2,193 m. (No. 42499), Carbonero Canyon, Sierra del Carmen, Coahuila (No. 103738),²³ and San Esteban Island (No. 64586).²⁴

CROTALUS MOLOSSUS NIGRESCENS Gloyd

Five specimens are from Puente Colorada, Veracruz (No. 110603), and Tacícuaro, Michoacán (Nos. 110599–602). The scale counts of these, in the order cited, are: Scale rows 27–25–21, 27–25–19, 27–23–19, 27–25–19; ventrals 171, 171, 165, 175, 166; caudals 25 (♂), 24 (♂), 19 (♀), 21 (♀), 26 (♂). Nos. 110600 and 110602, which have the lowest ventral counts known for *nigrescens*, are somewhat lighter posteriorly than the other specimens, and the black tail bands are faintly visible (4 or 5 in one, 6 or 7 in the other). In the other specimens, including a smaller *nigrescens* (No. 110601) from the same locality, the tail is completely and uniformly black. The specimens in question do not, however, seem to approach *basiliscus*, in which the tail is considerably lighter.

²² Gloyd, 1940, pp. 109–112, map 7, pl. 11, fig. 2.

²³ Gloyd and Smith, 1942, p. 235.

²⁴ Gloyd, 1940, p. 160.

The Museum has eight other specimens, as follows: CHIHUAHUA: Guadalupe y Calvo (Nos. 46186-7), DISTRITO FEDERAL: Mexico City (No. 12724); Tlalpam (No. 46353). DURANGO: El Salto (No. 46485). MICHOACÁN: Pátzcuaro (No. 46424). SAN LUIS POTOSÍ: Mountains near Jesús María (No. 46125). ZACATECAS: Plateado (No. 46469).

CROTALUS POLYSTICTUS (Cope)

Three female specimens are from Tacícuaro, Michoacán (Nos. 110604-6). Scale counts of these, in the order numbered, are: Scale rows 4-27-19, 33-27-21, 29-27-21; ventrals 168, 171, 169; caudals 20, 20, 22; supralabials 14-14, 13-14, 13-14; infralabials 15-15, 14-15, 14-15.

The Museum has nine others, from "Guanajuato" (Nos. 24448, 26152, 46508); "Mexico" (No. 29775); Valley of Mexico (No. 32170); Plateado, Zacatecas (Nos. 46330-1); and Tupátaro (Guanajuato? Michoacán? Jalisco?) (Nos. 10250, 11363).

CROTALUS SCUTULATUS SCUTULATUS (Kennicott)

Ten specimens, all from the state of Chihuahua, were collected: 10 miles north of Casas Grandes (No. 104609), and Río Santa María, near Progreso (Nos. 104610-3, 104615-8, 104621).

The Museum has four other Mexican specimens, from "Chihuahua" (Nos. 14225, 14278); Chihuahua City (No. 46450); and Casas Grandes, Chihuahua (No. 46373).

CROTALUS SCUTULATUS SALVINI Günther

Crotalus scutulatus salvini GLOYD, Chicago Acad. Sci. Spec. Publ. 4, pp. 201-202, map 15, 1940.

One specimen, from San Diego, south of Tehuacán, Puebla (No. 110926). A male, with 21-25-17 scale rows, 164 ventrals, 26 caudals, 13-15 supralabials, and 14-15 infralabials.

The Museum has no others.

***CROTALUS STEJNEGERI Dunn**

The Museum has two specimens, the type (No. 46486) and a para-type (No. 46460) from Plomosas, Sinaloa.²⁵

CROTALUS TRISERIATUS TRISERIATUS (Wagler)

Two specimens (male) are from Tacícuaro, Michoacán (Nos. 110597, 110925). Scale rows 25-23-17, 23-23-17, respectively; ventrals 147, 146; caudals 24, 25; supralabials 11-?; infralabials 12-?, 11-12. Dor-

²⁵ Dunn, 1919, p. 213; Gloyd, 1940, pp. 232-233, map 21, pl. 29.

sal surface very dark, number of blotches indeterminate. Certain blotches that can be discerned are four scales long and cover about five rows transversely.

The Museum has two others, from Santa Teresa, Nayarit (No. 46333), and Ameca, Jalisco (No. 46465), referred by Gloyd (1940, p. 87) to this subspecies.

CROTALUS TRISERIATUS ANAHUACUS Gloyd

One male specimen (No. 110598) is from El Limón Totalco, Veracruz. It was found quietly sunning itself in a lava field at about 10 o'clock on the morning of March 1, 1940. The preceding night had been very cold, and even *Toluca* (typically nocturnal snakes) were found sunning themselves the following day. The elevation was 7,600 feet. Scale rows 21-21-15, ventrals 161, caudals 25, supralabials 9-10, infralabials 9-9, body spots 40, tail spots 7.

The Museum has no others of the subspecies.

***CROTALUS TRISERIATUS OMILTEMANUS Günther**

A single specimen in the Museum (No. 46343) is from Omilteme, Guerrero.²⁶

***CROTALUS TRISERIATUS PRICEI Van Denburgh**

The Museum has 18 specimens,²⁷ all from the state of Chihuahua: Dist. Galeana, 15 miles north of Chuichupa, 2,418 m. (Nos. 42865-72); Río Piedras Verdes, 6,800 feet. (No. 26594); Dist. Guerrero (Nos. 40062, 42494-5, 42498); Colonia García (Nos. 46327-9; Guadalupe y Calvo (No. 46350); "Chihuahua" (No. 55858).

***CROTALUS VIRIDIS VIRIDIS (Rafinesque)**

The Museum has four specimens,²⁸ No. 264 from Espía, Chihuahua, and Nos. 61955 and 61957-8 from Sonora.

***CROTALUS WILLARDI Meek**

The Museum has 10 specimens, from CHIHUAHUA: Río Piedras Verdes (No. 26593); Dist. Guerrero (Nos. 42496-7); Sierra Madre (No. 42709); Colonia García (Nos. 46322-6). ZACATECAS: Sierra Madre (No. 46332).

DENDROPHIDION VINITOR Smith

FIGURE 13

Dendrophidion vinitor SMITH, Proc. Biol. Soc. Washington, vol. 54, pp. 74-76, 1941.

²⁶ Gloyd, 1940, p. 95-96, map 6, pl. 8.

²⁷ Amaral, 1927a, p. 53.

²⁸ Amaral, 1929a, p. 89.

One specimen, the type (No. 110662), was collected at Piedras Negras, Guatemala.

The Museum has two Mexican specimens, from Teapa, Tabasco (No. 46589), and "Mexico" (No. 7099).

Dugès (1892, pp. 100-101, pl. 5, colored) describes and illustrates this species on the basis of a specimen from Motzorongo, Veracruz. His specimen has 155 ventrals, 120 caudals, and a single anal, and thus agrees with *vinitor*.

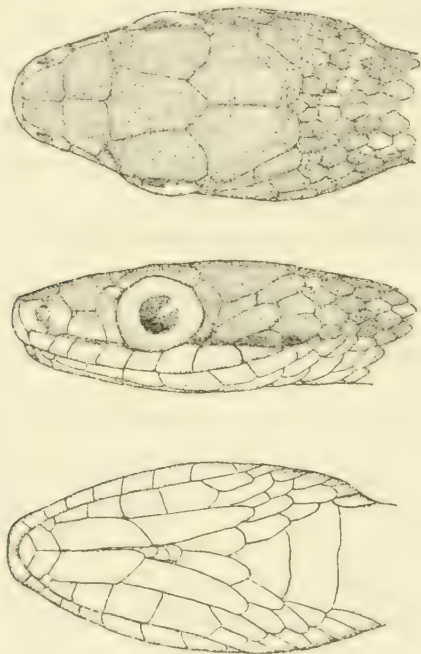


FIGURE 13.—Head scales and pattern of *Dendrophidion vinitor* Smith, from EHT-HMS No. 27496, La Gloria, Oaxaca. Twice natural size.

Three other specimens recently examined are EHT-HMS Nos. 27496-8, from La Gloria, Oaxaca (north of Niltepec), collected by Thomas MacDougall. These are all females, with 163, 160, 154 ventrals, respectively; all with a single anal; caudals ?, 117, 113, respectively. The preoculars are 1-1, postoculars 2-2, and temporals 2-2 in all; the fourth, fifth, and sixth labials border the orbit, and the temporals are separated from the sixth labial in all. All have the barred pattern typical of the species.

*DIADOPHIS REGALIS LAETUS Jan

The Museum has a single specimen, No. 2067, from Santa Magdalena, Sonora.

DIADOPHIS DUGESII Villada

One specimen (No. 109935) was taken 6 miles east of Quiroga, Michoacán. It was found under a large stone in an open oak woods, after a heavy shower.

In addition to this specimen, six others in the National Museum have been examined: Guanajuato (Nos. 11361, 12681); Mirador, Veracruz (No. 31051); Mexico (Nos. 12728, 26141-2). The variation in scutellation of these follows: Scale rows 17-15 in two, 17-17 in five; supralabials 7-7 in five, 8-8 in two; infralabials 7-8 in one, 8-8 in five, 8-10 in one; three postoculars on one side in two, otherwise two preoculars and two postoculars; temporals 1-2 on one side in two, on both sides in four, 1-1 on one side in two, on both sides in one. Ventrals and caudals in the order listed above: 178, 56 (♂); 207, 53 (♀); 201, 52 (♀); 180, 57 (♂); 177, ? (♂); 179, 57 (♂); 205, 53 (♀). The range in ventrals and caudals of five males now known of the species is 177 to 183, 56 to 57, respectively, in five females, 201 to 207, and 49 to 53, respectively. In no specimen does the white of the ventral surface extend onto the first row of dorsal scales.

The maxilla of the Michoacán specimen has nine subequal teeth, followed after a long diastema by two much enlarged, ungrooved (although flanged) teeth, which are distinctly offset from the other teeth.

This species is very distinct from *regalis*, differing by having the white of the ventral surface not encroaching upon the first row of dorsal scales (does in *regalis*), a distinctly lower ventral count (more than 206 in males, more than 220 in females of *regalis*), usually 17 scale rows posteriorly (rarely 17 in *regalis*). These differences may be subspecific, but they are so great that they are here considered specific. *D. regalis* has a maxillary dentition exactly like that of the specimen described of *dugesii*.

The proper orthography of the specific name of this species is *dugesii*, not *dougesii* as it was spelled in the original description. Two reasons support this conclusion: (1) The species is named for Dugès; (2) the spelling is corrected in two places in the same volume. In the index to that volume, the article is listed "El *Diadophis punctatus*, v. *Dugesii*." In the page of "Erratas Notables del Tomo III," the correction is made in the spelling of the name in the description itself ("Página 226, Dice DOUGESII, Debe Decir DUGESII").

**DRYADOPHIS MELANOLOMUS MELANOLOMUS* (Cope)

The Museum has three specimens, including the type (No. 24985)²⁰ and two others (Nos. 10302, 24986) from Yucatán.

²⁰ Cope, 1868a, p. 134.

****DRYADOPHIS MELANOLOMUS SLEVINI* (Stuart)**

The Museum has six specimens, five from María Madre Island (Nos. 24674-8) and one from María Magdalena Island (No. 24679), in the Tres Mariás Islands. One other specimen has been examined, from María Madre Island (L. M. Klauber No. 22686). The ventrals and caudals, respectively, in the order listed, are 188, 110; 185, ?; 183, ?; 188, ?; 184, 111; 182, ?; 185, ? . Slevin (1926, p. 201) gives counts for six other specimens.

***DRYADOPHIS MELANOLOMUS STUARTI*, new subspecies**

Holotype.—U. S. N. M. No. 110924, collected near Acapulco, Guerrero, on September 3, 1939, by Rozella Smith.

Paratypes.—Four, including EHT-HMS No. 10094, a topotype; Mus. Zool. Univ. Mich. No. 80202, Paso del Río, Colima; Carnegie Mus. No. 7253, Cualata, Colima; and U.S.N.M. No. 56283, Colima.

TABLE 9.—*Variation in Dryadophis melanolomus stuarti*

Museum No.	Sex	Ventrals	Caudals
EHT-HMS No. 10094 ¹ -----	?	195	115
Carnegie No. 7253 ² -----	?	179	117
U.M.M.Z. No. 80202 ³ -----	?	184	115
U.S.N.M. No. 110899-----	♂	182	116
U.S.N.M. No. 110900-----	♂	182	-----
U.S.N.M. No. 110901-----	♂	180	-----
U.S.N.M. No. 110905-----	♂	180	118
U.S.N.M. No. 110907-----	♂	179	115
U.S.N.M. No. 110908-----	♂	180	113
U.S.N.M. No. 110924-----	♂	185	-----
U.S.N.M. No. 56283-----	♀	185	118
U.S.N.M. No. 110901-----	♀	184	-----
U.S.N.M. No. 110902-----	♀	188	-----
U.S.N.M. No. 110903-----	♀	188	113
U.S.N.M. No. 110906-----	♀	184	113

¹ From Taylor, 1940, p. 458.

² From Smith, 1939, p. 317.

³ From Oliver, 1937, p. 19.

Diagnosis.—Like *D. m. slevini*, except markings on chin, gular region, and anterior part of belly very poorly defined in adults, more distinct in the young; middle of belly not dark-pigmented; dorsal scales uniform light olive in adults, practically without evidence of remnants of the dark juvenile markings.

Description of holotype.—A large male; dorsal color uniform light olive (bluish shine where scales are shed); supralabial region somewhat lighter, but not abruptly differentiated in color from top of

head; most dorsal scales with a very narrow black border on their anterodorsal and anteroventral edges. Ventral surface of head with scattered, irregular, bluish stippling not forming distinct marks; dorsal ground color extending to "keel" on each edge of ventrals; a poorly defined light line following the lateroventral "keel"; some bluish stippling medial to this light line, but middle of belly scales immaculate. A small, dark spot at the median corner of each subcaudal, forming a zigzag series of dots down middle of tail.

Scale rows 17-17-15; ventrals 185; anal divided; tail broken; supralabials 9-9, fourth, fifth, and sixth entering orbit; infralabials 11-11; preoculars 1-1; postoculars 2-2; temporals 2-2; body length 855 mm.

Variation.—Ten specimens from the mainland have been examined and are referred to *stuarti*. They are from Finca Juárez (Nos. 110901-6), Salto de Agua (No. 110900), La Esperanza (No. 110899), Acacoyagua (No. 110908), and Colonia Soconusco (No. 110907), all in the vicinity of Escuintla, Chiapas. For reasons noted by Stuart (1941, p. 95) these cannot be considered paratypes of *stuarti*, although for the time being they are referred to that race in the absence of any apparent morphological differences.

The entire series of 15 *stuarti* show a range of variation in ventral counts from 179 to 195. The latter count (from literature) may be in error, as the next highest is 188. Exclusive of this count, the average for 14 specimens is 182.9. One specimen has 10-10 supralabials, another 9-10; the infralabials are 10-10 in one, 10-11 in one; in one specimen only two labials enter the eye; otherwise the scutellation is much as in the holotype.

Comparisons.—The chief differences between *stuarti* and *slevini* are in pattern. In the latter the dark, checkered, anterior ventral pattern is extremely prominent in the young; the marks extend posteriorly more than a third the length of the belly. Large adults of the same race still show very distinct, although somewhat more diffuse, ventral markings, and they retain a fairly distinct black edging on the dorsal scales. In half-grown specimens, a dark stripe passing through the eye is still evident, while in adults it may disappear. The supralabials are mostly white (cream) in subadults but may become partly suffused with olive in adults. In *stuarti* the anterior ventral pattern is lost almost completely in adults and subadults; by this character all except the young can be distinguished at a glance. The black edging on the dorsal scales is so faint that it can be distinguished only by completely exposing the bases of the scales, while in *slevini* the marks are evident without spreading the scales. The ocular stripe is not apparent, and in adults the supralabial region is entirely pigmented.

There is a significant difference in number of ventrals, but this is not one than can certainly be used in identifying specimens. In 13 specimens of *slevini* (6 counts from Slevin, 1926, p. 201) the ventrals vary from 182 to 202, average 189.7, while the average in *stuarti* is 182.9. In the latter 86 per cent are less than 185, while in *slevini* 76.9 per cent are 185 or more.

DRYADOPHIS MELANOLOMUS TEHUANAE, new subspecies

Holotype.—U.S.N.M. No. 110917, from Cerro Guengola, Oaxaca.

Paratypes.—Twenty, including U.S.N.M. Nos. 110909–16, from Tres Cruces, Oaxaca, and Nos. 110918–23, La Concepción, Oaxaca; and U. M. M. Z. Nos. 82546–52, from Tres Cruces, San Pedro, and Mixtequilla Mountains, Oaxaca. All these localities are in the vicinity of Tehuantepec.

TABLE 10.—*Variation in Dryadophis melanolomus tehuanae*

Museum No.	Sex	Ventrals	Caudals
U.M.M.Z. No. 82546	♀	192	106
U.M.M.Z. No. 82547	♀	189	106
U.M.M.Z. No. 82548	♀	187	103
U.S.N.M. No. 110909	♀	184	106
U.S.N.M. No. 110911	♀	184	107
U.S.N.M. No. 110913	♀	188	-----
U.S.N.M. No. 110914	♀	189	108
U.S.N.M. No. 110916	♀	176	108
U.S.N.M. No. 110917	♀	186	107
U.S.N.M. No. 110918	♀	186	105
U.S.N.M. No. 110919	♀	187	105
U.S.N.M. No. 110923	♀	176	-----
U.M.M.Z. No. 82549	♂	182	110
U.M.M.Z. No. 82550	♂	182	110
U.M.M.Z. No. 82551	♂	181	111
U.M.M.Z. No. 82552	♂	183	110
U.S.N.M. No. 110910	♂	188	108
U.S.N.M. No. 110912	♂	185	112
U.S.N.M. No. 110915	♂	181	109
U.S.N.M. No. 110920	♂	174	107
U.S.N.M. No. 110921	♂	178	108
U.S.N.M. No. 110922	♂	182	106

Diagnosis.—Like *D. m. stuarti*, except caudals 103 to 112, as opposed to 113 to 118 of the first.

Description of holotype.—A female with 17–17–15 scale rows, 186 ventrals, 107 caudals, 9–9 supralabials (fourth, fifth, and sixth entering orbit), 10–10 infralabials, 1–1 preoculars, 2–2 post-oculars, and 2–2 temporals.

Remarks.—Hartweg and Oliver (1940, p. 21) give the counts of seven specimens with complete tails, and 13 of the series in the National Museum also have complete tails. In these 20 specimens the range of variation is from 103 to 112. Tail counts on 10 *stuarti* from Chiapas, Guerrero, and Colima show a variation of from 113 to 118. The caudals of Tres Mariás Islands specimens (*slevini*) may be as few as 105, but these are differentiated by another character (anterior ventral pattern).

DRYADOPHIS MELANOLOMUS VERAECRUCIS Stuart

Four specimens were secured, at Potrero Viejo (Nos. 110895–6) and Cuautlapan (Nos. 110897–8), Veracruz. All are males, with the following scale counts (in the order given above): Ventrals 176, 179, 171, 177; caudals 104+, 112, 115, 110; supralabials 9–9, 9–9, 8–9, 9–9; infralabials 11–11, 10–11, 10–11, 10–11; preoculars 1–1; postoculars 2–2; temporals 2–2. The two Cuautlapan specimens (both young) differ from all other young and subadults by completely lacking light cross-bars. In their stead are two dorsolateral light lines, one on each side, running between the fifth and sixth scale rows; these lines are visible only anteriorly. They are faintly indicated in one of the Potrero specimens, which also has light cross bands anteriorly.

The Museum has eight other specimens, from Tabasco (Teapa, No. 46592) and Veracruz (Catemaco, Nos. 46478–9; Jalapa, No. 5346; Mirador, No. 25007; Orizaba (?), No. 30357; San Rafael, Jicaltepec, No. 32162; Tuxpan, No. 25194).

***DRYMARCHON CORAIS CLEOFAE** Brock

The Museum has a single specimen (No. 24683)³⁰ from María Madre Island, Tres Mariás Islands.

DRYMARCHON CORAIS EREBENNUS (Cope)

Drymarchon corais erebennus SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 478–479, 1941.

Six specimens were collected, at three localities: Hacienda La Clementina, near Forlón, Tamaulipas (Nos. 105307–8, 110866–7); 5 km. south of Chapulhuacán, Hidalgo (No. 110868); and Huichihuayán, San Luis Potosí (No. 110869).

The Museum has three others from Mexico: No. 1859 from Matamoros, Tamaulipas; No. 25200 from Tuxpan, Veracruz; and No. 37515 from Sabinas, Coahuila.

³⁰ Smith, 1941r, p. 475.

DRYMARCHON CORAIS MELANOCERCUS Smith

Drymarchon corais melanocercus SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 473-474, 1941.

Four specimens were secured: Nos. 110872-3 at Piedras Negras, Guatemala; No. 110870 at Tenosique, Tabasco; and No. 110871 at Palenque, Chiapas. A very large specimen found at Piedras Negras measured 8 feet 9 inches in total length, in life.

The Museum has four other typical Mexican specimens, from Mexico (No. 1416); Yucatán (No. 6554); Chichen Itzá, Yucatán (No. 46393); and Mirador, Veracruz (No. 25093). One specimen (No. 46447), from Metlatoyuca, Puebla, is an intergrade with *crebennus*; its color is like that of *melanocercus*, with which it may be associated.

Two specimens collected at Tonalá, Chiapas (Nos. 110875-6) and one from near Escuintla (La Esperanza), Chiapas (No. 110874), appear to be intergrades between *rubidus* and *melanocercus*; for geographic reasons it seems best to associate them with the latter race. Like them are four others in the Museum: No. 30526 from El Barrio, No. 46496 from Santa Efigenia; No. 61959 from "Tehuantepec," Oaxaca; and No. 46587 from Valley of Comitán, Chiapas. These presumed intergrades may well be considered eventually as a distinct race.

DRYMARCHON CORAIS ORIZABENSIS (Dugès)

Drymarchon corais orizabensis SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 477-478, 1941.

A single specimen, No. 110886, is from Potrero Viejo, Veracruz, collected by Dyfrig McH. Forbes.

The Museum has one other typical specimen, No. 24999, from Mirador, Veracruz. Included in the same series (Nos. 25000-3) are four specimens that appear to be intergrades between *melanocercus* and *orizabensis*; I consider that they more closely approach the latter than the former.

DRYMARCHON CORAIS RUBIDUS Smith

Drymarchon corais rubidus SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 474-476, 1941.

Nine specimens were taken: OAXACA: Ixtepec (No. 110885); Tres Cruces (No. 110880); Tehuantepec (Nos. 110881-4); Cerro Arenal (Nos. 110878-9). PUEBLA: San Diego, south of Tehuacán (No. 110977).

The Museum has six other typical specimens: Rosario, Sinaloa (No. 46430, type); San Sebastián, Jalisco (No. 46588); Colima (Nos. 61948-9); Acapulco, Guerrero (No. 46538); and Tehuantepec, Oaxaca (No. 30125). Another specimen, from María Madre Island (No. 24683),

tentatively referred previously to this race, is *Drymarchon corais cleofae* Brock.

DRYMARCHON CORAIS UNICOLOR Smith

Drymarchon corais unicolor SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 470-472, 1941.

Two specimens were collected, one near La Esperanza (near Escuintla), Chiapas (No. 110865), and one at Colonia Hidalgo, 8 km. north of La Esperanza (HMS No. 14556).

The Museum has three other Mexican specimens, from "Tehuantepec" (No. 30424); Huehuetan, Chiapas (No. 46464); and "Mexico" (No. 39051).

DRYMOBIUS CHLOROTICUS (Cope)

Two specimens were taken, one on Cerro Ovando, 5,000 feet, Chiapas (No. 110824), the other from Finca Juárez, 3,000 feet, Chiapas (No. 110825). These are, respectively, male and female; ventrals 158, 168; caudals 91+, 125; supralabials 9-9; infralabials 10-11, 10-10; preoculars 1-1; postoculars 2-2; temporals 2-2.

The Ovando specimen was found under a small piece of wood, preparing to shed (eyes translucent, nearly opaque). The Juárez specimen was found on the ground beneath bushes.

The hemipenes of the Ovando specimen agree perfectly with the generic characters of *Drymobius* as redefined by Stuart (1932, pp. 1-16, pls. 1-5), as does also the number of maxillary teeth (31) of the same specimen. However, this number is considerably greater than that given by Boulenger (1894, p. 16), who says the teeth number no more than 25. The ventral and caudal counts, however, agree with those of *chloroticus* (Stuart, 1933, p. 10).

The Museum has one other Mexican specimen, from Tuxtla Volcano, San Andrés, Veracruz (No. 46404).

DRYMOBIUS MARGARITIFERUS MARGARITIFERUS (Schlegel)

Drymobius margaritiferus margaritiferus SMITH, Proc. U. S. Nat. Mus., vol. 92, p. 393, 1942.

Thirteen specimens were collected, as follows: VERACRUZ: Cuautlapan (Nos. 110828-33); Potrero Viejo (Nos. 110826-7); Orizaba (No. 110834). TABASCO: Tenosique (No. 110835). CHIAPAS: San Juanito, near Palenque (No. 110835); Tonalá (No. 110836). GUATEMALA: Piedras Negras, Petén (No. 110838).

The fact that the southernmost specimens, from Tonalá, Piedras Negras, and Tenosique, have the lowest ventral counts probably has some significance; the present series is not sufficiently large to warrant segregation of two races, however. The scale rows are regularly 17-15, with the exception of one (No. 110829) with 13 scale rows near the

anus; the preoculars are uniformly 1-1, the postoculars 2-2; the temporals are 2-1 in one, 1-2 in another, and 2-2 in the remainder.

The Piedras Negras specimen contained in its stomach two *Eleutherodactylus rhodopis*, one *E. alfredi*, two *Syrrhopus*, and one other unidentifiable amphibian.

TABLE 11.—*Variation in Drymobius margaritiferus margaritiferus*

U.S.N.M. No.	Sex	Ventrals	Caudals	Supralabials	Infralabials	Labials enter eye
110826	♀	-----	114	9-9	10-11	4-5-6
110831	♀	153	-----	9-9	10-10	4-5-6
110836	♀	152	-----	9-10	10-10	4-5-6
110838	♀	148	105	9-9	10-11	4-5-6
110827	♂	152	123	9-9	11-11	4-5-6
110828	♂	152	131	9-9	11-11	4-5-6
110829	♂	150	127	9-9	10-11	4-5-6
110830	♂	158	123	9-9	11-11	4-5-6
110832	♂	155	128	9-9	10-10	4-5-6
110833	♂	152	125	9-9	10-10	4-5-6
110834	♂	155	120	9-9	-----	4-5-6
110835	♂	145	-----	9-9	10-?	4-5-6
110837	♂	143	-----	9-9	10-10	4-5-6

The Museum has 23 other Mexican specimens, as follows: CAMPECHE: Campeche (No. 46454). CHIAPAS: El Salto (No. 46510). SAN LUIS POTOSÍ (No. 46539). TABASCO (No. 6625). TAMAULIPAS: Altamira (Nos. 46540-1). VERACRUZ: Catemaco (No. 46480); Minatitlán (No. 64194 [Old no. 5254]); Mirador (Nos. 24996-7); Orizaba (Nos. 12119, 65436); San Rafael (No. 32161); Tuxpan (Nos. 25195-9). YUCATÁN: Chichen Itzá (No. 46572); Puerto Morelos (No. 46532). There are three other specimens from "Mexico" (Nos. 12088, 12099, 16396).

DRYMOBIUS MARGARITIFERUS FISTULOSUS Smith

Drymobius margaritiferus fistulosus SMITH, Proc. U. S. Nat. Mus., vol. 92, pp. 382-383, 1942.

Nineteen specimens, all from the vicinity of Tehuantepec, Oaxaca, are referred to this race, although they are so faded by long preservation in formalin that the details of scale pattern are largely obliterated. The precise localities are: Tehuantepec, Nos. 110839-47, 110859-60; Tres Cruces, No. 110848; Cerro Arenal, Nos. 110849-50; Escurana, No. 110851; Rincón San Pedro, Nos. 110852-3; La Concepción, Nos. 110854-5.

The scale rows are uniformly 17-15, the preoculars 1-1, and the postoculars 2-2; the temporals are 1-2 in one, 2-1 on one side of one, and 2-2 in the others.

TABLE 12.—*Variation in Drymobius margaritiferus fistulosus*

U.S.N.M. No.	Sex	Ventrals	Caudals	Supralabials	Infralabials	Labials enter eye
110839	♂	150	116	9-9	9-9	4-5-6
110840	♂	147	-----	8-8	9-9	3-4-5
110844	♂	150	-----	9-9	10-11	4-5-6
110845	♂	150	-----	9-9	11-11	4-5-6
110846	♂	148	117	9-9	10-10	4-5-6
110849	♂	149	-----	9-9	10-10	4-5-6
110850	♂	146	-----	9-9	11-11	4-5-6
110852	♂	150	125	9-9	10-10	4-5-6
110854	♂	150	142	9-10	11-11	4/5-5/6-6/7
110860	♂	152	117	8-9	11-10	3/4-4/5-5/6
110841	♀	149	115	9-9	10-10	4-5-6
110842	♀	149	-----	9-9	10-10	4-5-6
110843	♀	149	113	9-9	10-10	4-5-6
110847	♀	149	-----	9-9	9-10	4-5-6
110848	♀	150	126	9-9	10-10	4-5-6
110851	♀	149	125	9-9	10-11	4-5-6
110853	♀	152	121	9-9	10-11	4-5-6
110855	♀	150	-----	9-9	10-10	4-5-6
110859	♀	151	112	9-9	10-10	4-5-6

The Museum has eight other specimens, from Miramar, Nayarit (No. 51480, type), Colima (Nos. 31480-3, 56163), Tehuantepec, Oaxaca (No. 30484), and Puente de Ixtla (No. 46545).

DRYMOBIUS MARGARITIFERUS OCCIDENTALIS Bocourt

Drymobius margaritiferus occidentalis SMITH, Proc. U. S. Nat. Mus., vol. 92, p. 383, 1942.

Seven specimens, all from southern Chiapas near Escuintla, were collected: Cruz de Piedra (Nos. 110861-2); Rancho Las Gradass (No. 110863); La Esperanza (Nos. 110856-8, 110864). Table 13 gives variation in certain characters.

TABLE 13.—*Variation in Drymobius margaritiferus occidentalis*

U.S.N.M. No.	Sex	Ventrals	Caudals	Supralabials	Infralabials	Labials enter eye
110856	♀	148	118	9-9	11-11	4-5-6
110857	♀	143	123	9-10	11-11	4/5-5/6-6/7
110862	♀	145	115	9-9	11-11	4-5-6
110858	♂	147	121	9-9	11-11	4-5-6
110861	♂	145	-----	9-9	11-11	4-5-6
110863	♂	140?	122	9-9	10-10	4-5-6
110864	♂	148	-----	9-9	11-11	4-5-6

The scale rows are uniformly 17-15, the preoculars 1-1, the postoculars 2-2, and the anterior temporals 2-2. The ventrals average somewhat fewer than in *fistulosus*.

The Museum has no other specimens from Mexico.

**ELAPHE BAIRDI* (Yarrow)

The Museum has a single Mexican specimen, No. 103692, from Carbonero Canyon, Sierra del Carmen, Coahuila.³¹

ELAPHE CHLOROSOMA (Günther)

Three specimens (Nos. 110299-110301) are from Tres Cruces, Oaxaca. The scale characters of these in the order given are: Scale rows 27-33-21, 31-37-23, 29-34-23; ventrals 257, 281, 269; caudals 126 (♂), 105 (♀), 99+ (♀); supralabials 9-9, 8-9, 8-8; infralabials 11-11, 10-11, 11-12; labials entering eye 4-5 (5-6), 4-5 (5-6), 4-5 (4-5). All are adults, lacking spots.

The Museum has one other, from Guanajuato (No. 11354).

ELAPHE FLAVIRUFA FLAVIRUFA (Cope)

Elaphe flavirufa flavirufa SMITH, Copeia, 1941, p. 133.

A single specimen (No. 110302) is from Potrero Viejo, Veracruz, collected by Dyfrig McH. Forbes. It is a male; scale rows 27-31-21; ventrals 254; caudals more than 108; supralabials 9-9, fourth, fifth, and sixth in contact with eye; infralabials 13-14; 38 blotches on body.

The Museum has four others, from Yucatán (No. 6566, type), Tabasco (No. 6626), Campeche (No. 14848), and Mirador, Veracruz (No. 24998).

ELAPHE FLAVIRUFA MATUDAI Smith

Elaphe flavirufa matudai SMITH, Copeia, 1941, pp. 132-134, fig. 1.

One specimen, the type (No. 110303), was found crawling along a trail at night near Salto de Agua, at 1,200 feet, Cerro Ovando, Chiapas.

The Museum has no others.

ELAPHE LAETA LAETA (Baird and Girard)

Two specimens are in the collection, one from between Lerdo and La Goma, Durango (No. 105294), the other from 25 km. north of Monterrey, Nuevo León (No. 110434). Scale data on these two, respectively, are: Ventrals 228, 223; caudals 72 (♀), 81 (♂); scale rows 25-29-21, 25-27-19; supralabials 8-8, 8-9; infralabials 13-?, 14-14; labials enter eye, 4-5, 4-5 (5-6); dorsal blotches, 43 and 34, on body.

³¹ Smith, 1938, p. 150.

The Museum has four other Mexican specimens, from Santa Caterina, Nuevo León (No. 2263), and Chihuahua (Nos. 14223, 14253, 14284).

**ELAPHE TRIASPIS* (Cope)

Eight specimens are in the Museum, from Chichen Itzá, Yucatán (Nos. 46398, 46574-9), and Chilón, Chiapas (No. 46512).

ENULIUS SUMICHRASTI Bocourt

One specimen (No. 103913) was collected at night along a trail near La Esperanza, Chiapas. It is a male, with 185 ventrals and the tail incomplete; infralabials and supralabials 7-7; one postocular, the upper fused with the parietal.

This is a well-defined species, characterized chiefly by the shape of the enlarged rostral. The type apparently did not originate west of Tehuantepec, but probably from the east (the only other definite record is from Tonalá, Chiapas).

The Museum has no others of the species.

ENULIUS UNICOLOR (Fischer)

One specimen (No. 109912) is from Tres Cruces, Oaxaca. It is a male, with 174 ventrals, 125 caudals, and 7-7 supralabials and infralabials.

This species is well differentiated from *sumichrasti*, which has a distinctly larger rostral, but in that character it is very similar to *flavitorques*, which also has a smaller rostral. The only difference of any constancy I can find between *flavitorques* and *unicolor* is the presence in the former of a light nuchal collar, its absence in the latter. All known Mexican specimens are collarless, while the only collarless specimen of *flavitorques* of which I am aware is one in a series of five from Escuintla, Guatemala (No. 12694). None of this series shows any tendency toward the characters of *sumichrasti* in form of rostral. Eventually it may be possible to show some average differences between *flavitorques* and *unicolor* in scutellation.

E. murinus Bocourt (and therefore *longicaudatus* Cope) is based upon "Tehuantepec" specimens, which, according to the figure, correspond with the present specimen, and with two secured by Hartweg and Oliver (1940, p. 23). The species may not occur in the lowlands about Tehuantepec, but Dr. Hartweg has it from farther east along the Pacific coast.

The Museum has no others of the species.

*ERYTHROLAMPUS AESCULAPII (Linnaeus)

One specimen in the Museum (No. 31283) is labeled "Guadalajara," Jalisco, without further comment or indication of collector. As there is no other precise record of this genus in Mexico, and the authority for the above specimen is unknown, I believe it unwise to accept this record as valid. It is a male, with 15 scale rows; ventrals 194; caudals 59; supralabials 7-7; infralabials 9-9; preoculars 1-1; postoculars 2-2; temporals 1-2; 16 pairs of black rings on body, 3 on tail. Scales in red areas black-tipped; red areas covering about 8 scale lengths; pairs of black rings usually complete about belly; scales between the rings of a single pair also black-tipped. Black rings covering $1\frac{1}{2}$ -2 scale lengths laterally, 2- $2\frac{1}{2}$ dorsally; a whole pair, with its enclosed light rings, covers $5\frac{1}{2}$ -6 scale lengths. Belly with but a few flecks of black, aside from rings. Rings about tail very distinct ventrally. A large area on top of head dark; anterior edges of internasals and prefrontals, anterior and median edges of first and upper secondary temporals, anterior half of lower secondary temporal, and all except anterior upper edge of rostral, light cream; a curved, cream line near posterior edge of parietals; supralabials cream, except for dark posterior edges; posterior edges of a few anterior infralabials dark. First pair of black rings (nuchal) barely involving tips of parietals, and the two partially fused middorsally, thus interrupting the narrow light band between them.

In spite of the belief that acceptable evidence of the occurrence of this genus in Mexico is lacking, there are numerous vague references, summarized in the following synonymy, which refer only to "Mexico?" records:

- Erythrolamprus aesculapii* LICHTENSTEIN, Nomenclator . . . Berolinensis, p. 30, 1856.—MÜLLER, Reisen in den Vereinigten Staaten, Canada und Mexico, p. 607, 1865.—GÜNTHER, Biologia Centralia-Americana, Rept. Batr., p. 166, 1895.—BOULENGER, Catalogue of the snakes in the British Museum, vol. 3, pp. 200-204, 1896.—AMARAL, Mem. Inst. Butantan, vol. 4, p. 216, 1929.
- Erythrolamprus larratus* JAN, Cenni sul Museo Civico di Milano, ed indice sistematico dei rettili ed anfibi esposti nel medecimo, p. 48, 1857 (*nomen nudum*).
- Erythrolamprus bizona* JAN, Arch. Zool., vol. 2, pp. 104, 105 (part), 1863.
- Erythrolamprus aesculapii bizona* JAN, Elenco sistematico degli ofidi . . . , p. 55 (part), 1863.
- Erythrolamprus venustissimus* var. B. JAN, Cenni sul Museo Civico di Milano, ed indice sistematico dei rettili ed anfibi esposti nel medecimo, p. 48, 1857.
- Erythrolamprus venustissimus* var. D GÜNTHER, Catalogue of the snakes in the British Museum, pp. 47-48, 1858.—GARMAN, Bull. Essex Inst. vol. 16, p. 28, 1884.
- Erythrolamprus venustissimus* BOCCOURT, Mission scientifique au Mexique et dans l'Amérique centrale, Rept., livr. 10, pp. 658-660, pl. 38, fig. 4, 1886.
- Erythrolamprus guentheri* GARMAN, Mem. Mus. Comp. Zool., vol. 8, p. 154, 1883 (for *E. venustissimus* var. D of Günther).

***FICIMIA OLIVACEA OLIVACEA Gray**

Two specimens are in the Museum,³² including No. 6329 from Orizaba, Veracruz, and No. 30131 said to be from "Tehuantepec." The locality for the latter appears to be erroneous.

***FICIMIA OLIVACEA STRECKERI Taylor**

Two specimens (Nos. 25201-2) are in the Museum, from Tuxpan, Veracruz.³³

FICIMIA PUBLIA Cope

Ficimia publia SMITH and TAYLOR, Journ. Washington Acad. Sci., vol. 31, pp. 362-364, 1941.

Four specimens were secured, at Piedras Negras, Guatemala (No. 110295), Tehuantepec, Oaxaca (No. 110297), La Concepción, Oaxaca (about 50 km. west of Tehuantepec) (No. 110298), and La Esperanza, near Escuintla, Chiapas (No. 110296). The Piedras Negras and La Esperanza specimens were found at night along trails through forests.

This species has not previously been reported from Pacific slopes north of the Isthmus of Tehuantepec, from where it is represented by M. C. Z. No. 33609 and U. M. M. Z. No. 85713, both from Chilpancingo, Guerrero, collected by W. W. Brown. The former has 34 blotches on the body, the latter 32. The ventrals are 156, 153; caudals 32 (♀), 36 (♂); supralabials 7-7, 7-7; infralabials 8-8, 7-8; preoculars 1-1; postoculars 2-2; total length 279 mm., 314 mm.; tail 39 mm., 50 mm., respectively. Both specimens have the internasals distinct. In pattern the specimens are like others of the species.

In spite of the discovery of typical *publia* in this region, it does not appear wise to consider *ruspator* a synonym of it, although if valid two closely related species would appear to occupy much the same territory. The number of blotches in the two known *ruspator* (43 to 45) is much higher than in any of the 19 *publia* for which this character is known (range 25 to 35).

The Museum has two other Mexican specimens, both from "Yucatán" (Nos. 16427-8).

***FICIMIA VARIEGATA (Günther)**

A single specimen in the Museum is from Guichicovi, Oaxaca (No. 30126).³⁴

³² Smith and Taylor, 1941, pp. 366-367, figs. 4, 9, 13.

³³ Smith and Taylor, 1941, p. 368, figs. 3, 8, 14.

³⁴ Smith and Taylor, 1941, pp. 365-366.

GEAGRAS REDIMITUS Cope

Twenty-nine specimens were secured (Nos. 109876-902, HMS Nos. 12097, 15722), all from the vicinity of Tehuantepec, Oaxaca.

This curious snake bears no relationship to *Geophis*, near which it is allocated by Boulenger. It more nearly resembles *Tantilla*, as concluded by Dunn. The maxillary teeth are 12 in number, thickened, and flattened at the tips; the two rear teeth are distinctly grooved, distinctly (although not greatly) enlarged, and are preceded by a short diastema. The hemipenis extends to the suture between the sixth and seventh caudals; the distal third (corresponding to two caudal lengths) is covered by calyces, and appears to be capitate; the median third is covered with nearly straight spines; the proximal third is spineless, ridged. The sulcus is single, not divided.

TABLE 14.—*Variation in Geagras redimitus*

No.	Sex	Ventrals	Caudals	No.	Sex	Ventrals	Caudals
109876	♂	119	29	15722	♂	122	31
109877	♂	-----	29	109901	♂	117	29
109878	♂	122	28	109902	♂	123	29
12097	♂	124	30	109879	♀	113	29
109881	♂	123	33	109880	♀	115	28
109882	♂	119	28	109883	♀	113	26
109885	♂	119	32	109884	♀	114	26
109886	♂	122	32	109888	♀	113	26
109887	♂	124	30	109889	♀	114	27
109890	♂	118	29	109892	♀	114	28
109891	♂	120	28	109893	♀	117	-----
109895	♂	121	29	109894	♀	116	29
109896	♂	124	28	109898	♀	119	27
109897	♂	121	26	109900	♀	113	-----
109899	♂	120	29				

The Museum has one other, the type, from Tehuantepec (No. 30115).³⁵

*GEOPHIS ANOCULARIS Dunn

A single specimen, the type, is in the Museum, from Totontepec, Oaxaca (No. 46556).³⁶

GEOPHIS BLANCHARDI Taylor and Smith

Four specimens (Nos. 109936-9) are from the type locality, 2 miles southwest of Acultzingo, Veracruz. The ventrals and caudals, re-

³⁵ Cope, 1876, p. 141.

³⁶ Dunn, 1920, pp. 127-128.

spectively, of these are: ♀, 164 ?; ♀, 165, 34; ♂, 152, 38; ♂, 150, 37. A distinct difference is indicated between the sexes in these counts. Supralabials 6-6 in all; infralabials 7-7 except in one, which has 6-7; third and fourth labials entering orbit in all; mental separated from chin shields; posterior pair of chin shields slightly smaller than anterior in one, three-quarters as large in another, two-thirds in one, and one-half in the other. Belly checkered, the light area about equal in extent to the black area, or somewhat greater.

These specimens were found under stones on grassy hillsides, at the summit of the ridge in the Sierra Madre Oriental.

The Museum has no others of the species.

***GEOPHIS CANCELLATUS** Smith

Two specimens³⁷ are in the Museum, including the type (No. 46440) from Chicharras, Chiapas, and one paratype (No. 46441), probably from the same locality.

***GEOPHIS CHALYBEUS** (Wagler)

Three specimens, cotypes of *Rhabdosoma guttulatatum* Cope, are in the Museum, from Mirador, Veracruz (Nos. 25024-5, 30399).³⁸

GEOPHIS MUTITORQUES (Cope)

Geophis mutitorques SMITH, Proc. New England Zool. Club, vol. 18, pp. 53-55, 1941.

Six specimens were collected, all at Pan de Olla, Veracruz (near Teziutlán, Puebla) (Nos. 109940-4, HMS 13074). These have been discussed elsewhere.

Three specimens from near Zacatlán, Puebla (Amer. Mus. Nat. Hist. Nos. 14218, 15251, 19773) add somewhat to the knowledge of the range of variation in the species. All are males, with 161, 158, 157 ventrals, respectively; 41, 34, 40 caudals; 6-6, 5-6, 6-6 supralabials; 7-7 infralabials; 0-0 preoculars; 1-1 postoculars; 1-2 temporals; posterior chin shields in contact.

The Museum has no others of the species.

***GEOPHIS NASALIS** (Cope)

Two specimens (Nos. 46611, 46613) in the Museum are from Chicharras, Chiapas.³⁹

³⁷ Smith, 1941a, pp. 1-2.

³⁸ Cope, 1885b, p. 385; Smith, 1941a, pp. 3, 6.

³⁹ Smith, 1941a, pp. 4-5.

GEOPHIS OMILTEMANA Günther

Geophis omiltemana SMITH. Proc. New England Zool. Club, vol. 18, p. 51, 1941 (footnote).

One specimen (No. 109945) is from Omilteme, Guerrero, collected by E. H. Taylor. Scales in 17 rows; ventrals 148; caudals 45; male. Supralabials 6-6; infralabials indeterminate; third and fourth labials entering orbit; chin shields separated from mental. Color as described for the species.

The Museum has no others of the species.

***GEOPHIS ROSTRALIS** (Jan)

Two specimens in the Museum (Nos. 31351-2) are from "Mexico." The scale rows are 17, supralabials and infralabials 6-6, in each; respectively the ventrals are 137, 138, caudals 48 ♂, 43.

GEOPHIS SEMIDOLIATUS (Duméril and Bibron)

Of this species 349 specimens were collected, of which Nos. 109968-110294 are from Cuautlapan, Veracruz, and Nos. 109946-67 from Potrero Viejo, Veracruz. These were invariably found in banana patches under fallen banana trunks or under debris. They are rarely found in the dry season but are common after the rains start.

The Museum has 11 other specimens, from Mirador (Nos. 12114, 25026-8), hills west of Veracruz (No. 5315), and Orizaba (No. 12118), Veracruz; and "Mexico" (Nos. 7294, 12090, 12307, 12485, 12732).

***HETERODON NASICUS NASICUS** Baird and Girard

The Museum has a single specimen (No. 61954) from "Sonora."

HETERODON NASICUS KENNERLYI Kennicott

Six specimens in the collection are as follows: Progreso, Chihuahua (No. 104665); 17 miles west of Carmen, Chihuahua (No. 105290); 13 miles west of San Pedro, Coahuila (Nos. 105296-9).

TABLE 15.—*Variation in Heterodon nasicus kennerlyi*

U.S.N.M. No.	Sex	Ventrals	Caudals	Suprala- bials	Azygous scales	Accessory scales	Loreals
104665	♀	144	31	8-8	1	3	1-1
105290	♀	143	31	8-8	1	3	1-1
105296	♀	142	29	8-8	1	3	1-2
105297	♂	134	42	8-8	1	2	1-2
105298	♂	137	41	8-8	1	4	1-2
105299	♂	138	40	8-8	1	2	1-1

Five other specimens in the Museum are like the above: No. 1282(2), Matamoros, Tamaulipas; No. 17531, Corralitos, Chihuahua; No. 56132, Chihuahua; and No. 60044, Tlahualilo, Durango. These five have two to five accessory scales; one has no azygous scale; one has two loreals, the others one. These specimens and those reported by Dunkle and Smith (1937, pp. 9-10) outline very well the geographic distribution of *kennerlyi*, which occurs in southern New Mexico, western Texas, and northern Mexico east of western Chihuahua to the exclusion of other forms.

However, a specimen from "Sonora" (collected by Jenkins and Evermann, No. 61954) has 3-4 loreals and 16 azygous scales, and accordingly cannot be considered *kennerlyi*. I have examined several similar Arizona specimens. I cannot observe readily definable differences between these and typical *nasicus*, to which I refer them. The area occupied by them in Sonora and Arizona no doubt borders the western edge of the range of *kennerlyi*, and it is conceivable that the southwestern and northern ranges of *nasicus* are continuous through northern New Mexico. The southwestern population is most curiously situated, however, and may perhaps have characters, not now defined, that will separate it from other *n. nasicus*.

***HYP SIGLENA OCHRORHYNCHUS OCHRORHYNCHUS** Cope

The Museum has a single specimen, No. 14287, from "Chihuahua." It is a female with 21-21-15 scale rows, 168 ventrals, 46 caudals, 8-8 supralabials, 10-10 infralabials, 1-1 preoculars (no subpreocular), 2-2 postoculars, 1-2-3 temporals. The postocular stripe is partially interrupted near the angle of the jaws.

***HYP SIGLENA OCHRORHYNCHUS JANII** (Dugès)

Four specimens in the Museum are from "Guanajuato" (Nos. 9889, 11369), Tupátaro, Michoacán (No. 46513),⁴⁰ and Río Verde, San Luis Potosí (No. 46444). These cannot be referred to *torquatus* or *affinis*, since they show no vestige of a light nuchal collar. They differ from typical *ochrorhynchus* at least in the large size of the nuchal spot, which covers 9 to 10 scale lengths, while northern specimens of the species have a considerably shorter nuchal spot or spots (2 to 6 scale lengths).

***HYP SIGLENA TORQUATA** (Günther)

Two specimens⁴¹ in the Museum are from Colima (No. 31385) and San Blas, Nayarit (No. 51479). The nuchal light collar is well defined in both.

⁴⁰ Taylor, 1939b, p. 373.

⁴¹ Taylor, 1939b, pp. 372-373.

IMANTODES CENCHOA LEUCOMELAS Cope

Imantodes cenchoa leucomelas SMITH, Proc. U. S. Nat. Mus., vol. 92, pp. 384-385, 1942.

Fifteen specimens were taken, as follows: GUATEMALA: Piedras Negras (No. 110519). CHIAPAS: La Esperanza (No. 110538), Las Gradass (Nos. 110540-2), and La Magnolia (No. 110539), all near Escuintla; Palenque (Nos. 110535-7). TABASCO: Tenosique (No. 110518). VERACRUZ: Cuautlapan (Nos. 110544-7); Tezonapa (No. 110543).

TABLE 16.—*Variation in Imantodes cenchoa leucomelas*

U. S. N. M. No.	Sex	Ventrals	Caudals	Supra- labials	Preocu- lars	Postocu- lars	Tempo- rals	Labials enter eye	Tail-body blotches
110535	♀	245	175	8-8	1-1	2-2	2-2	4-5	35-31
110536	♀	241	156	8-9	1-1	3-3	2-2	4/5-5/6	40-31
110537	♀	233	149	8-9	1-1	4-4	2-2	4/5-5/6	34-23
110538	♀	243	144	8-8	2-2	2-3	2-2	4-5	33-23
110539	♀	245	146	8-8	1-1	2-3	2-2	4-5	38-19
110541	♀	246	148	8-8	2-2	2-2	2-2	3-4-5	34-24
110544	♀	233	142	8-8	1-1	2-3	2-2	4-5/4	35-19
110546	♀	227	145	8-8	2-2	3-3	2-3	4-5	31-20
110549	♀	235	153	8-8	1-1	2-2	2-2	4-5	34-22
110540	♂	250	153	8-8	1-2	3-3	2-2	3-4-5	36-22
110542	♂	253	161	8-8	2-2	2-2	2-2	4-5	35-27
110543	♂	243	150	8-9	1-1	2-2	2-2	{ 3/4-4/5- 5/6 }	37-24
110545	♂	243	147	8-8	1-2	2-3	2-2	3-4-5	35-26
110547	♂	243	155	8-8	1-1	2-3	1-2	3-4-5	34-25
110548	♂	243	-----	7-8	1-1	2-2	2-2	{ 3-4/3- 4-5 }	32-?

The Museum has five other Mexican specimens: No. 16295, "Mexico"; Nos. 25035-6,⁴² Mirador, Veracruz (cotypes of *leucomelas*); No. 25037, "Mexican Plateau"; and No. 46388, Otatitlán, Veracruz.

IMANTODES GEMMISTRATUS Cope

Imantodes gemmistratus SMITH, Proc. U. S. Nat. Mus., vol. 92, pp. 385-386, 1942.

One specimen (No. 110521) is from La Esperanza, near Escuintla, Chiapas. It was found at night crawling on the ground and contained an *Anolis sericeus*. Female, with ventrals indeterminate; caudals 114; preoculars 1-1; supralabials 8-8, third, fourth, and fifth entering orbit; anterior temporals 1-1; 61 bands on body.

The Museum has no other Mexican specimens.

⁴² Cope, 1861, p. 296.

***IMANTODES LATISTRATUS (Cope)**

The Museum has one specimen (one of two cotypes) from Guadalajara, Jalisco (No. 24963),⁴³ and three others (Nos. 51481-3) from Miramar, Nayarit.

IMANTODES SPLENDIDUS LUCIODORSUS Oliver

Imantodes splendidus luciodorsus SMITH, Proc. U. S. Nat. Mus. vol. 92, p. 388, 1942.

Twelve specimens were collected, six at Palma Sola, Veracruz (Nos. 110529-34), and six at Palenque, Chiapas (Nos. 110522-7). All were found in dead, dry bromelias, during the dry season.

TABLE 17.—*Variation in Imantodes splendidus luciodorsus*

U. S. N. M. No.	Sex	Ventrals	Caudals	Preoculars	Supra- labials	Labials enter eye	Temporals	Body spots
110534	♀	218	113+	1-1	9-9	4-5-6	1-1	42
110530	♀	224	114+	1-1	8-8	3-4-5	1-1	51
110533	♀	225	-----	1-1	8-8	3-4-5	1-1	42
110522	♀	219	118	1-1	8-8	3-4-5	1-1	48
110526	♀	205	113	1-1	8-8	3-4-5	1-1	45
110523	♂	215	121	1-1	8-8	3-4-5	1-1	43
110524	♂	216	126	1-1	8-8	3-4-5	1-1	49
110525	♂	217	124	1-1	8-8	3-4-5	1-1	51
110527	♂	217	118	1-1	8-8	3-4-5	1-1	47
110529	♂	221	124	1-1	8-8	3-4-5	2-2	48
110531	♂	225	129	1-1	8-8	3-4-5	2-2	52
110532	♂	225	134	1-1	8-8	3-4-5	1-1	45

The Museum has no other specimens of this race.

IMANTODES SPLENDIDUS OLIVERI Smith

Imantodes splendidus oliveri SMITH, Proc. U. S. Nat. Mus., vol. 92, pp. 388-390, 1942.

A single specimen (No. 110523) was collected, near Tonalá, Chiapas. It was found at night crawling on the ground at the bank of a small stream, during the dry season.

The Museum has nine other specimens referred to this race: Nos. 12443, 30164-6, 30178-9, Tehuantepec, Oaxaca; and Nos. 3036-8, Juchitán, Oaxaca.

⁴³ Cope, 1887, p. 68.

TABLE 18.—*Variation in Imantodes splendidus oliveri*

U. S. N. M. No.	Sex	Ventrals	Caudals	Preoculars	Supralabials	Labials enter eye	Temporals	Spots
12443	♀	230	125	1-1	8-8	3-4-5	1-1	54
30164	♀	229	117	1-1	8-8	4-5	1-1	59
30165	♀	229	118	1-1	8-8	4-5	1-1	67
30166	♀	234	123+	1-1	8-8	4-5	1-1	52
30178	♀	227	130	1-1	8-8	3-4-5	1-1	58
30179	♀	226	105+?	1-1	8-8	3-4-5	1-1	47
30386	♀	224	117+	1-1	8-8	4-5	1-1	47
30387	♀	222	130	1-1	8-8	4-5	1-1	59
110528	♀	226	121	1-1	8-8	3-4-5	1-1	55
30388	♀	235	-----	1-1	8-8	3-4-5	1-1	60

***IMANTODES TENUISSIMUS Cope**

The Museum has two specimens, both from "Yucatán," including the type (No. 6563)⁴⁴ and a topotype (No. 24889).

LAMPROPELTIS ALTERNA (Brown)

Lampropeltis alterna SMITH, Copeia, 1941, p. 112; Proc. Rochester Acad. Sci., vol. 8, pp. 204-206, 1942.

A single specimen (No. 110819) is from near Saltillo, Coahuila. The Museum has no others of the species.

LAMPROPELTIS GETULUS SPLENDIDA (Baird and Girard)

Three specimens (Nos. 104662-4) are from Río Santa María, near Progreso, Chihuahua. All are females, with 23-23-19 scale rows, 7-7 supralabials, 1-1 preoculars, 2-2 postoculars, and two primary temporals; ventrals 213, 213, 219, and caudals 40, 46, 48, respectively.

The Museum has no other Mexican specimens.

***LAMPROPELTIS GETULUS YUMENSIS Blanchard**

A single specimen in the Museum (No. 21720) is from Santo Domingo, Sonora.⁴⁵

***LAMPROPELTIS PYROMELANA (Cope)**

A single specimen in the Museum is from Dist. Guerrero, Chihuahua (No. 40063).⁴⁶

⁴⁴ Cope, 1867b, pp. 317-318.

⁴⁵ Blanchard, 1921, p. 74.

⁴⁶ Blanchard, 1921, p. 235.

***LAMPROPELTIS RUTHVENI** Blanchard

A single specimen, the type (No. 46558), is in the Museum, from Pátzcuaro, Michoacán.⁴⁷

***LAMPROPELTIS TRIANGULUM ANNULATA** Kennicott

Three specimens are in the Museum, including No. 425 from "Mexico," No. 1845 from Monterrey, Nuevo León, and No. 37535 from Montemorelos, Nuevo León.⁴⁸

LAMPROPELTIS TRIANGULUM ARCIFERA (Werner)

Lampropeltis triangulum arcifera SMITH, Proc. Rochester Acad. Sci., vol. 8, pp. 198-199, pl. 1, fig. 1, 1942.

One specimen (No. 110823) is from the city golf links of Orizaba, Veracruz (presented by friends). It is a male; scale rows 21-21-17; ventrals 223; caudals 55; supralabials 7-7; infralabials 8-8; preoculars 1-1; postoculars 2-2; temporals 2-3; white bands (including nuchal) 28.

The Museum has three others: One from Orizaba, Veracruz (No. 30222), the others from "Mexico" (Nos. 1854, 32278).

***LAMPROPELTIS TRIANGULUM NELSONI** Blanchard

Ten specimens are in the Museum, including: Nos. 31492-4, Colima; No. 12680, Guanajuato; No. 46552, Acámbaro, Guanajuato (type); Nos. 24967-8, Guadalajara, Jalisco; No. 31491, Neshpa River, Sierra Madre, Michoacán; and Nos. 30504-5, "Mexican Plateau."⁴⁹

***LAMPROPELTIS TRIANGULUM OLIGOZONA** (Bocourt)

Two specimens (Smith, 1942d, pp. 201-202) are in the Museum: One (No. 46439) is from Huehuetán, Chiapas, and the other (No. 62210) lacks precise locality data (collected by Sumichrast).

LAMPROPELTIS TRIANGULUM POLYZONA Cope

Lampropeltis triangulum polyzona SMITH, Proc. Rochester Acad. Sci., vol. 8, pp. 200-202, 1942.

Three specimens are in the collection, two from Potrero Viejo, Veracruz (Nos. 110820-1), and one from Palma Sola, Veracruz (No. 110822). The latter was found in a bromelia; all were collected by Dyfrig McH. Forbes. Ventrals 230, 221, 229, respectively; caudals

⁴⁷ Blanchard, 1920, p. 8, pl. 1, fig. 2.

⁴⁸ Blanchard, 1921, p. 164.

⁴⁹ Blanchard, 1921, p. 158.

58, 60, 50; supralabials 7-7; infralabials 9-9; preoculars 1-1; postoculars 2-2; temporals 2-3; white bands (including nuchal) 26, 32, 23.

The Museum has 16 others, all (with definite locality) from the state of Veracruz: Minatitlán, No. 5254; Mirador, Nos. 6370, 25008-12; Orizaba, Nos. 7103(2), 12121, 61026; Tuxpan, Nos. 25192-3; no locality, Nos. 4506, 11377, 12487.

*LAMPROPELTIS TRIANGULUM SCHMIDTI Stuart

The Museum has a single specimen, No. 24684, from María Madre Island, Tres Marias Islands.⁵⁰

TABLE 19.—*Variation in Leptodeira annulata polysticta*

U.S.N.M. No.	Sex	Scale rows	Ventrals	Caudals	Preoculars	Body spots
111224	♀	21-23-17	206	86	3-3	51
111229	♀	21-23-16	211	82	1-2	59
111231	♀	21-23-17	197	84	2-2	54
111232	♀	21-23-15	199	85	2-3	57
111236	♀	21-23-15	207	89	3-3	59
111237	♀	21-23-16	201	79	3-3	61
111242	♀	21-23-15	203	-----	2-3	61
111247	♀	21-23-16	206	84	3-3	62
111249	♀	21-23-14	205	87	3-3	55
111250	♀	21-23-17	205	-----	3-3	64
111225	♂	21-21-15	202	-----	3-3	54
111226	♂	21-23-16	195	97	3-3	54
111227	♂	21-23-16	200	97+	3-3	50
111228	♂	21-23-15	204	93	3-3	58
111230	♂	21-23-15	200	98	2-3	61
111233	♂	21-23-15	205	91	3-3	54
111234	♂	21-23-15	204	-----	2-2	57
111235	♂	19-23-15	205	92	2-3	54
111238	♂	20-22-15	205	96	3-3	59
111239	♂	19-23-14	200	90	3-3	60
111240	♂	18-23-15	196	93	3-3	61
111241	♂	21-23-16	201	94	3-3	58
111243	♂	21-23-16	205	98	2-2	56
111244	♂	21-23-15	199	93	1-2	60
111245	♂	21-23-15	198	-----	3-3	58
111246	♂	21-23-15	202	96	2-3	66
111248	♂	20-23-15	203	88	3-3	50
111251	♂	21-23-16	200	90	2-3	57
111252	♂	21-23-15	200	97	3-3	59
111253	♂	19-23-15	204	89	3-3	59
111254	♂	21-23-15	200	-----	2-3	50

⁵⁰ Blanchard, 1921, p. 158.

LEPTODEIRA ANNULATA POLYSTICTA Günther

Thirty-one specimens are from the following localities: CHIAPAS: Near Escuintla (Las Nubes, Cerro Ovando, Nos. 111228-30; Salto de Agua, Cerro Ovando, Nos. 111231-8; La Esperanza, Nos. 111239-41; Rancho Las Gradass, Nos. 111242-3; La Magnolia, No. 111244; Finca Juárez, Nos. 111245-54). GUERRERO: Agua del Obispo, No. 111224. OAXACA: La Concepción, No. 111226; Lachiguiri, 7,100 feet, No. 111225. GUATEMALA: Piedras Negras, No. 111227. Nearly all were found at night by means of a lantern. One was climbing a tree trunk (Piedras Negras); two were on top of calladium leaves, searching for frogs and salamanders (La Esperanza) that were common on the leaves; many were found in arroyos, where frogs were abundant; and the ten from Finca Juárez were found climbing about in trees looking for and eating the eggs of *Agalychnis moreletii*. One was found during the day, in the axil of a calladium (Agua del Obispo). All except one were found in the dry season, when they congregate about arroyos.

All have 8-8 supralabials and 2-2 postoculars; one has 1-3-4 temporals, another 1-3-4 on one side, and another 1-3-3 on one side, but except for these the temporals are uniformly 1-2-3. The infralabials are 10-11 in four, 10-12 in one, 11-11 in three, and 10-10 in the remainder. Other data on variation are given in table 19.

The Museum has no others from Mexico.

*LEPTODEIRA ANNULATA SEPTENTRIONALIS (Kennicott)

The Museum has eight specimens,⁵¹ two of which (No. 4267) are the cotypes from Matamoros, Tamaulipas; another specimen (No. 4273) is from the same locality, and five others (Nos. 25206-7, 25209-11) are from Tuxpan, Veracruz.

LEPTODEIRA ANNULATA TAYLORI Smith

Leptodeira annulata taylori SMITH, Proc. Biol. Soc. Washington, vol. 54, pp. 115-118, 1941.

A single specimen, a paratype of *taylori* (No. 111257), was collected. It was found in a bromelia.

The Museum has 10 other typical specimens: Nos. 30208 (type), 30207, 7083, Orizaba, Veracruz; No. 30508, "Veracruz"; No. 65154, hills west of Veracruz, Veracruz; and No. 12113 (5), Mirador, Veracruz. Another specimen, an intergrade with *septentrionalis*, is No. 25211 from Tuxpan, Veracruz.

*LEPTODEIRA BRESSONI Taylor

A single specimen (No. 46459) in the Museum is from Plomosas, Sinaloa.⁵²

⁵¹ Taylor, 1939a, pp. 329-331.

⁵² Taylor, 1939a, p. 324.

LEPTODEIRA FRENATA (Cope)

Leptodeira frenata SMITH. Proc. Biol. Soc. Washington, vol. 52, pp. 192-195, fig. 8, 1939.

Three specimens (Nos. 111193-4, HMS No. 3771) are from Palma Sola, Veracruz. They were found in bromelias in the dry season.

This form shows a great similarity to *y. yucatanensis*, even to the paired parietal spots and the fusion of the postocular stripe with the first dorsal blotch.

The Museum has no others of the species.

LEPTODEIRA MACULATA (Hallowell)

Twenty-six specimens were secured, as follows: CHIAPAS: Tonalá (Nos. 111216-8). GUERRERO: Acapulco (No. 111201); Coyuca (Nos. 111202-3); Tierra Colorado (Nos. 111204-5); Agua del Obispo (No. 111206). OAXACA: Cerro Arenal (No. 111214); Tehuantepec (Nos. 111207-13); Cerro Guengola (No. 111215). SAN LUIS POTOSÍ: Huichihuayán (Nos. 111219-20). VERACRUZ: Potrero Viejo (Nos. 111195-7); Palma Sola (Nos. 111198-200). Some were found in bromelias, others under bark on trees, others at night in arroyos.

One (No. 111208) from Tehuantepec agrees with the dark color phase described by Taylor (1939a, p. 339, pl. 32, fig. 1). The supralabials are uniformly 8-8; preoculars 1-1 in one, 1-2 in two, 2-3 in one, and 2-2 in the remainder, postoculars 2-2 in all; and temporals 1-2-3 in all except two, which have four posterior temporals. Other details of variation are given in table 20.

The Museum has 40 other specimens, all from Mexico except perhaps the type (No. 7367), which presumably is from Nicaragua. They are as follows: COLIMA: Orolata (No. 56344); Colima (Nos. 31426, 31485-90). GUERRERO: Acapulco (No. 46403); Coyuca (No. 46344). JALISCO: Guadalajara (No. 24962); Miramar (Nos. 51471-7); San Blas (No. 51478). OAXACA: Zanatepec (No. 46498); Santa Efigenia (No. 46497); Tehuantepec (Nos. 30306-7, 30480). SINALOA: Mazatlán (No. 6836); Rosario (No. 62201). VERACRUZ: Orizaba (Nos. 6324, 7095); hills west of Veracruz (No. 5317); Mirador (Nos. 6373, 25040, 61990-2); Tuxpan (No. 25208). INDEFINITE: "Mexico" (Nos. 11378, 16389, 32169); "Cape St. Lucas" (No. 11290).

Mus. Comp. Zool. No. 11420, from "Colima" (Glückert), has the fewest body spots (17-18) of any recorded in *maculata*, closely approaching *smithi* in this respect. Another (No. 11419) with the same locality data has 21-22 body spots, a number within the previously known range of the species.

TABLE 20.—*Variation in Leptodeira maculata*

U.S.N.M. No.	Sex	Scale rows	Ventrals	Caudals	Infralabials	Body-tail spots
111195	♂	?-??-17	174	67	?-?	28-14
111196	♂	21-23-17	178	68	10-10	27-13
111198	♂	21-23-16	175	67	10-10	28-11
111199	♂	21-23-17	173	63	10-10	26-11
111200	♂	21-23-17	179	68	10-10	32-14
111205	♂	21-23-17	167	75	10-10	27-13
111209	♂	21-23-16	174	81	10-10	37-16
111210	♂	21-23-16	173	81	10-10	31-12
111213	♂	21-25-17	174	72	10-10	30-14
111214	♂	21-25-17	170	74	10-11	35-14
111218	♂	21-23-16	172	70	10-10	29-15
111197	♀	23-25-17	181	59	10-10	27-10
111201	♀	23-23-17	177	72	10-10	33-12
111202	♀	22-25-17	172	71	9-9	31-15
111203	♀	23-25-17	176	70	10-10	36-15
111204	♀	21-23-17	177	68	10-10	38-15
111206	♀	21-23-17	174	-----	10-10	33-?
111207	♀	21-23-17	172	-----	11-11	33-?
111208	♀	21-23-16	174	69	9-10	32-13
111211	♀	21-23-17	179	62	10-10	38-13
111212	♀	21-23-17	172	67	10-10	29-11
111215	♀	21-23-17	174	62	10-10	48-13
111216	♀	21-23-17	175	62	10-10	35-12
111217	♀	21-23-17	171	64	10-10	29-13
111219	♀	21-23-17	170	60	10-10	25-8
111220	♀	23-25-17	170	55	10-10	24-7

LEPTODEIRA MYSTACINA Cope

Three specimens were secured, one (No. 111221) 3 miles north of Acapulco, Guerrero (under a flake on a boulder); one (No. 111222) from Cerro Arenal, Oaxaca (at night in an arroyo, hunting geckos); and one (No. 111223) on Cerro Guengola, Oaxaca. All have 19-19-17 scale rows; the ventrals are 193, 194, 193, respectively; caudals 75 (♂), ? (♀), 66+ (♀); preoculars and postoculars 2-2; temporals 1-2-3; spots on body 11, 11-13, 14-15; spots on tail 6-7 in No. 111223.

The Museum has three others, the types from Tehuantepec, Oaxaca (Nos. 30339-40),⁵³ and one from Acapulco, Guerrero (No. 46551).

***LEPTODEIRA PUNCTATA (Peters)**

A single specimen, the type of *Leptodeira pacifica* Cope, is in the Museum (No. 6893), from Mazatlán, Sinaloa.⁵⁴

⁵³ Cope, 1869, p. 151.⁵⁴ Cope, 1868b, p. 310.

LEPTODEIRA SMITHI Taylor

Two specimens (Nos. 111255-6) were secured 4 km. north of Apatzingán, Michoacán. They were found at night in an arroyo hunting frogs (*Hyla smithi*). These agree in detail with the description by Taylor. The scale rows are 21-21-17, 21-23-17, respectively; ventrals 169, 166; caudals 73+ (♂), 75 (♂); supralabials 8-8; infralabials 10-10; preoculars and postoculars 2-2; temporals 1-2-3; spots on body 13-14, 15; spots on tail 6-7, 6.

The Museum has no others of the species.

*** LEPTODEIRA YUCATANENSIS YUCATANENSIS** (Cope)

The Museum has three specimens, including the type (No. 24857)⁵⁵ from "Yucatán," and one other specimen (No. 46566) from the same locality; also No. 46397, Chichen Itzá, Yucatán.

LEPTODEIRA YUCATANENSIS MALLEISI Dunn and Stuart

Three specimens (Nos. 111258-60) are from Palenque, Chiapas. Data on these specimens, respectively, are: Scale rows 21-21-15, 21-21-15, 21-23-17; ventrals 181, 184, 182; caudals 79 (♂), 70 (♀), ? (♀); supralabials 8-8; infralabials 11-11 (or 10-10) in all; preoculars 2-2, 2-2, 1-2; postoculars 2-2, 2-2, 1-1; temporals 1-2-3 in all; anal divided; total length 627 mm., 567 mm., 414+mm.; tail length 143 mm., 118 mm., 82+mm.; rhombs on body and tail 30-16, 28-13, 29-13. The dorsal rhombs usually terminate laterally on the first scale row. The chin is stippled, the edges of the lower labials dark. Nape stripe is short and fails to reach the first dorsal rhomb by two or three scales. The temporal stripe from eye to first dorsal rhomb is completely broken on one side in one, and partially interrupted on both sides of another.

All were found in bromelias.

The Museum has no others from Mexico.

LEPTOPHIS DIPLTROPIS DIPLTROPIS (Günther)

Three specimens are in the collections, all from the state of Oaxaca: Escurana (No. 110550); San Pedro Quiechapa (No. 110551); and La Concepción (No. 110552). All have 15-11 scale rows, 8-8 supralabials, 1-1 preoculars, 2-2 postoculars, and 1-2 temporals; respectively the ventrals are 178 (♀), 170 (♂), 176 (♂); caudals 145, 137+, 153+.

The Museum has three others, from Acaponeta, Nayarit (No. 46458), and Tehuantepec, Oaxaca (Nos. 30175-6).

The ventral counts of 30 mainland Mexican specimens vary from 165 to 181, and the caudal counts of 23 specimens from 126 to 161.

⁵⁵ Cope, 1866, p. 127.

It is noteworthy that two British Museum specimens, recorded by Boulenger (1894 p. 111), from the Tres Mariás Islands (collected by A. Forrer) have higher ventral (185, 186) and a higher caudal (160, 166) count than other specimens. This corresponds with the differences found between mainland *Drymarchon corais rubidus* and the Islands *D. m. cleofae*; between *Constrictor c. imperator* and *C. c. sigma*; *Dryadophis melanolomus stuarti* and *D. m. slevini*; *Lampropeltis triangulum blanchardi* and *L. t. schmidtii*; *Masticophis flagellum striolatus* and *M. f. variolosus*; and completely restricted to the Islands, without close mainland relatives, is *Evelenophis nelsoni*. The only snakes known from the Tres Mariás Islands that do not show obvious differences from mainland specimens are *Orybelis acuminatus*, *Pelamis platurus*, and *Agkistrodon bilineatus*; a rattlesnake is said to occur, but its identity is unknown (Stejneger, 1899, p. 71). Even some of these three, when known from more numerous specimens, may show differences not now apparent. The race of *Leptophis diplotropis* from Tres Mariás Islands, which lacks a name, is here called—

***LEPTOPHIS DIPLOTROPIS FORRERI**, new subspecies

Type.—Brit. Mus. Nat. Hist. specimen *m* of Boulenger's Catalogue of Snakes, vol. 2, p. 111, 1894, from Tres Mariás Islands, collected by A. Forrer.

Paratype.—Specimen *n*, of the same Catalogue.

Diagnosis.—Like *Leptophis d. diplotropis*, except the ventral scales more numerous (185 to 186 as opposed to 165 to 181), and the caudal scales perhaps usually more numerous (160 to 166 as opposed to 126 to 161).

Description of type.—An adult male, with ventrals 185; caudals 160; otherwise as typical of the species.

LEPTOPHIS MEXICANUS MEXICANUS Duméril and Bibron

Seven specimens were secured: CHILAPAS: Aguacate, near Escuintla (No. 110555); Cruz de Piedra, near Escuintla (No. 110556); Tonali (No. 110554). TABASCO: Tenosique (No. 110553). VERACRUZ: Mata de Caña, 25 miles southeast of Jalapa (No. 110557); San Juan de la Punta (No. 110558); Potrero Viejo (No. 110559). Scale rows 15-11 in all; supralabials 8-9 in two, 8-8 in others; infralabials 9-10 in one, 10-10 in one, 12-12 in one, 11-11 in the others; preoculars 2-2 in one (No. 110555), 1-1 in others; postoculars 2-2; temporals 1-2. Respectively the ventrals are 160 (♂), 151 (♂), 160 (♂), 155 (♂), 169 (♀), 164 (♀), 157 (♂); caudals 157, 149, 151, —, 167, 150+, 152+.

The Museum has two others, so identified but not checked by me, from Orizaba, Veracruz (No. 30493), and Altamira, Tamaulipas (No. 46524).

***LEPTOPHIS MEXICANUS YUCATANENSIS** Oliver

The Museum has three specimens, from Chichen Itzá, Yucatán (No. 46567), and "Yucatán" (Nos. 24884-5), all paratypes (Oliver, 1942, p. 10).

***LEPTOTYPHLOPS DULCIS** (Baird and Girard)

Two Mexican specimens are in the Museum, No. 4872 from Monterrey, Nuevo León, and No. 46580 from Bagdad, Tamaulipas.

***LEPTOTYPHLOPS HUMILIS DUGESII** (Bocourt)

Three specimens are in the Museum, No. 26140 from "Mexico," No. 49632 from Talpa, Jalisco, and No. 48537 from "Guanajuato."⁵⁶

***LEPTOTYPHLOPS MYOPICA MYOPICA** (Garman)

Two specimens are in the Museum, No. 7291 from Monterrey, Nuevo León, and No. 66886 from Panuco, Veracruz.

LEPTOTYPHLOPS PHENOPS PHENOPS (Cope)

Seventeen specimens were collected, from Palma Sola (10 miles east of San Juan de la Punta), Veracruz (Nos. 110308-11); vicinity of Tehuantepec, Oaxaca (Nos. 110312-21, HMS Nos. 18584, 18597); Río Grande, 12 miles north of Niltpec, Oaxaca (No. 110322).

The Museum has 18 other Mexican specimens, from Tehuantepec, Oaxaca (Nos. 12444, 30091-4, 30289-95, 30531-3, 46560), Jalpan, Querétaro (No. 46581), and Coatzacoalcos (Puerto Mexico), Veracruz (No. 61183).

The Veracruz specimens do not seem distinguishable from the Oaxaca ones. Most distinctive of all is the one from Jalpan, Querétaro, in which the pupil is not at all visible, there is no striping whatever, and the light marks so characteristic of the species, on the tail and head, are completely lacking. In scale counts it is normal, and until other specimens are available from the same region it is referred to this species and race. The Río Grande specimen approaches the character of *bakewelli* in having the rostral elongate and the first dorsal scale reduced, so that the rostral contacts the supraocular on one side (narrowly separated on the other). On the basis of the latter specimen, and because of geographic probability, *bakewelli* is considered a race of *phenops*.

The dorsal scales, from rostral to spine, and the subcaudals, respectively, are as follows: 12444, 238, 19; 30091, 243, 19; 30092, 236, 19; 30093, 234, 18; 30094, 248; ?; 30289, 254, 16; 30290, 247, 13; 30291, 237,

⁵⁶ Klauber, 1910, pp. 129-131.

16; 30292, 236, 18; 30293, 243, 19; 30294, 244, 18; 30531, 241, 18; 30532, 232, 20; 30533, 240, 16; 46560, 258, 14; 46581, 249, 19; 61183, 252, 22; 110308, 258, 15; 110309, 249, 19; 110310, 241, 19; 110311, 257, 17; 110312, 247, 21; 110313, 252, 13; 110314, 260, 17; 110315, 256, 14; 110316, 241, 19; 110317, 263, 14; 110318, 259, 17; 110319, 260, 16; 110320, 239, 20; 110321, 250, 16; 110322, 242, 13.

LEPTOTYPHLOPS PIENOPS BAKEWELLI Oliver

Three specimens were taken, one (No. 110305) at Chilpancingo, Guerrero, and two (Nos. 110306-7) at Acahuitzotla, Guerrero. Dorsal scales from rostral to spine 248, 259, 256, respectively; subcaudals 17, 18, 16, respectively.

The Museum has two others, No. 46340 from La Salada, Michoacán, and No. 30295 from Tehuantepec, Oaxaca. The former has no light spot on the head, 262 dorsals, and 19 subcaudals; the latter is normally marked and has 265 dorsals, 18 subcaudals.

LOXOCEMUS BICOLOR Cope

One specimen (No. 110324) is from Tehuantepec, Oaxaca. The scale rows are 31-33-25; ventrals 256; tail broken, female; supralabials 11-11; infralabials 14-14; preoculars 1-1; postoculars 2-3.

The Museum has one other, from "Nicaragua" (No. 16131).

LOXOCEMUS SUMICHRASTI Bocourt

One specimen (No. 110323) is from Acapulco, Guerrero. Scale rows 31-33-25; caudals 43, male; supralabials 11-11; preoculars 1-1; postoculars 3-3.

The Museum has three others, from Colima (No. 61924) and "Mexico" (Nos. 86639, 89387).

MANOLEPIS NASUTUS (Cope)

Eleven specimens were taken, all in the state of Oaxaca: Tres Cruces (Nos. 110336-7); Cruz de Piedra, 24 km. west of Salina Cruz (Nos. 110341-2); El Limón, 28 km. northwest of Tehuantepec (No. 110343); Tehuantepec (Nos. 110338-40); Las Pilas, 20 km. southwest of Tehuantepec (No. 110344); between Ingenio Santo Domingo and San Miguel Chimalapa (Nos. 110345-6).

These specimens uniformly have 19-19-15 scale rows; 8-8 supralabials; 1-2-3 temporals; and 0-0 loreals. The preoculars are 1-1 in all except one, which has 1-2; and the postoculars are 2-2 in all except two, which have 2-3. Variation in other characters is given in table 21.

The Museum has nine other specimens, from "Colima" (Nos. 31478-9, 56319); Acapulco, Guerrero (No. 46601); Magdalena, Jalisco

(No. 67372), San Geronimo (Iztepec), Oaxaca (No. 46360), and Tehuantepec (No. 30086-8), Oaxaca.

TABLE 21.—*Variation in Manolepis nasutus*

U.S.N.M. No.	Sex	Ventrals	Caudals	U.S.N.M. No.	Sex	Ventrals	Caudals
110336	♂	171	77	110338	♀	175	62
110337	♂	173	77	110340	♀	182	67
110339	♂	171	76	110341	♀	176	70
110345	♂	165	77	110342	♀	175	67
110346	♂	167	79	110343	♀	177	67
				110344	♀	178	71

*MASTICOPHIS BILINEATUS Jan

Six specimens are in the Museum, from Guaymas, Sonora (No. 15880; Batopilas, Chihuahua (No. 46382); San Juan Capistrano, Zacatecas (No. 46481); Pedro Pablo, Nayarit (No. 46417); Guadalajara, Jalisco (No. 32212); Cuicatlán, Oaxaca (No. 46499).⁵⁷

MASTICOPHIS FLAGELLUM TESTACEUS (Say)

Masticophis flagellum flavigularis SMITH, Journ. Washington Acad. Sci., vol. 31, p. 397, 1941.

One specimen was collected 15 miles north of Monterrey, Nuevo León (No. 111268).

The Museum has five others, as follows: Pequería Grande (No. 1995) and Santa Caterina (No. 1992), Nuevo León; Mier, Tamaulipas (No. 48091); Chijol, San Luis Potosí (No. 46476); and San Bernardino Ranch, Sonora (No. 21052).

All have 8-8 supralabials, and 2-2 preoculars, postoculars and temporals. Respectively the scale rows are 17-12, 2-2, 17-13, 17-13, 17-12, and 17-13; ventrals 190 (♂), 2, 197, 2 (♀), 193, 197; infralabials 10-11, 10-10, 10-10, 10-11, 10-11, 11-11. The tails are incomplete in all; two have counts of 100+ and 110+.

MASTICOPHIS FLAGELLUM LINEATULUS Smith

Masticophis flagellum lineatulus SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 394-397, 1941.

Three specimens are from 11 miles north of San Buenaventura, Chihuahua (No. 105292, type) and from Progreso, near the Río Santa María, Chihuahua (Nos. 104675-6).

⁵⁷ Smith, 1941n, pp. 389-390.

The Museum has four other specimens from Mexico: No. 1988, Alamo de Parras, Coahuila; Nos. 14279, 14283, Chihuahua; and No. 46355, Guanacevi, Durango.

* *MASTICOPHIS FLAGELLUM PICEUS* (Cope)

A single specimen in the Museum, from Mexico, is labeled Altata, Sinaloa (No. 33570).

MASTICOPHIS FLAGELLUM STRIOLATUS (Mertens)

Masticophis flagellum striolatus SMITH, Journ. Washington Acad. Sci., vol. 31, 1941, pp. 393-394.

Two specimens were secured, one 10 km. south of Cuernavaca, Morelos (No. 111277), the other at Coyuca, near Acapulco, Guerrero (No. 111278).

The Museum has 18 other specimens, as follows: Acaponeta, Nayarit (No. 46483); Atemajac, Jalisco (No. 46386); Colima (Nos. 32178, 32221-2, 32232-4, 62027-9, 62031-4); Zacatula River, near Lauria, Guerrero (No. 32344); Sierra Madre, Chacán River, Michoacán (No. 62026); Hurcha Volcano, plains of Nuruapa, Michoacán (No. 62030).

All specimens have 17-13 scale rows, 2-2 preoculars and postoculars; the supralabials are 8-8 except in two (Nos. 32344, 62030), which have 9-9; and the temporals are 2-2 except in eight, which have three posterior temporals. Other data on variation are given in table 22.

TABLE 22.—*Variation in Masticophis flagellum striolatus*

U.S.N.M. No.	Sex	Ventrals	Caudals	Infralabials	U.S.N.M. No.	Sex	Ventrals	Caudals	Infralabials
32178	♀	187	-----	10-11	62031	♀	185	101+	10-10
32222	♀	190	105+	11-?	62033	♀	189	108+?	10-11
32232	♀	193	-----	10-10	32221	♂	183	-----	-----
32233	♀	192	116	-----	46483	♂	183	118+	10-11
32234	♀	190	110	9-10	62028	♂	189	125	10-11
32344	♀	189	115	10-10	62030	♂	189	118	10-10
46386	♀	194	112	11-11	62032	♂	183	123	10-10
62026	♀	191	113	10-11	62034	♂	193	99+	10-11
62027	♀	191	111+?	10-11	111277	♂	189	120+	-----
62029	♀	191	96+	10-11	111278	♂	184	117	10-10

Fifteen other counts on mainland specimens of this race are available in the literature (Boulenger, 1893, pp. 388-389; Oliver, 1937, p. 19; Taylor, 1938, pp. 524-525; Van Denburgh, 1897, p. 463). All counts available (35) show a total range of from 183 to 195 ventrals, sexed

specimens showing a variation of 184 to 194 in females, 183 to 193 in males; the single count of 195 is not sexed. These may be contrasted with 13 counts on specimens from the Tres Mariás Islands, which show a range from 192 to 197, sexed specimens showing a variation of from 192 to 197 in males, 195 to 197 in females. Seven of these counts (including the 197 ♂) are from Boulenger (*loc. cit.*) and may need verification. There is a distinct average difference between mainland and Tres Mariás Islands specimens in this character, however; only one female and one male from the mainland overlap the entire Islands series. Accordingly it appears that the Islands specimens represent a different race, which may be named—

***MASTICOPHIS FLAGELLUM VARIOLOSUS, new subspecies**

Holotype.—U. S. N. M. No. 24681, an adult male skin from María Magdalena Island, Tres Mariás Islands.

Paratypes.—Twelve, including U. S. N. M. Nos. 24680, 24682, topotypes; L. M. Klauber Nos. 22650, 22685, 22715, María Madre Island; and seven specimens in British Museum (Natural History) from "Tres Mariás Islands," collected by Forrer.

Diagnosis.—As in *M. f. striolatus*, except ventrals 192 to 197 in males, 195 to 197 in females; lips not notably mottled in adults.

Description of holotype.—Brownish olive above, this color extending to the "keel" on each side of the belly; belly and tail otherwise immaculate, yellowish. All dorsal scales with a dark spot at the posterior apex, smaller on anterior scales, larger and elongate on median and posterior scales; caudal scales with two or three black dots at tip, one on each scale pit. Head slightly reddish; sides of head uniform brownish; lower labial border yellow, not stippled; median gular region suffused with light brown.

Scale rows 17-17-13; ventrals 195; tail incomplete; supralabials 8-8, 4th and 5th entering orbit; 9-9 infralabials; 2-2 preoculars, postoculars and temporals.

Variation.—The paratypes are much like the type. The only deviation in scutellation, except in ventral and caudal counts (given in the accompanying table) is in number of infralabials; two have 9-10, one has 10-?, and two 10-10.

Remarks.—As stated above, the chief difference between the present race and *striolatus* is in ventral count; there also appear to be a difference in the extent of mottling on the sides of the head; there is none in *variolosus* adults, while in *striolatus* the upper labials are prominently mottled (*cf.* Ortenburger, 1928, pl. 25).

TABLE 23.—*Variation in Masticophis flagellum variolosus*

Number	Sex	Ventrals	Caudals
Brit. Mus.....	♂	192	125
Brit. Mus.....	♂	197	128
U.S.N.M. No. 24681.....	♂	195	-----
Klauber No. 22650.....	♂	194	118+
Klauber No. 22715.....	♂	193	125
U.S.N.M. No. 24680.....	♀	196	106+
U.S.N.M. No. 24682.....	♀	195	-----
Klauber No. 22685.....	♀	197	111+
Brit. Mus.....	♀	195	113
Brit. Mus.....	♀	195	117
Brit. Mus.....	♀	197	115
Brit. Mus.....	♀	195	113
Brit. Mus.....	♀	197	120

MASTICOPHIS MENTOVARIUS MENTOVARIUS (Duméril and Bibron)

Masticophis mentovarius SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 388-389, 1941.

Eighteen specimens were collected: CHIAPAS: 3½ miles southwest of Colonia Soconusco (No. 111269); Tonalá (No. 111270). OAXACA: Tehuantepec (Nos. 111274-6; HMS Nos. 12082, 12293, 12450-3, 12476, 12761, 12775); Cerro de Huamelula (No. 111272); Mixtequilla (No. 111271); Cerro Arenal (No. 111273, HMS No. 18352).

The Museum has three others, from Juchitán (No. 30231) and Tehuantepec (Nos. 30422-3), Oaxaca.

Data taken on 11 of this series show a constant scale row count of 17-13, supralabials 7-7 (except in one which has 6-6), preoculars and

TABLE 24.—*Variation in Masticophis mentovarius mentovarius*

Number	Sex	Ventrals	Caudals	Infralabials
30422.....	♀	197	110+	10-10
111269.....	♀	205	107	10-10
111270.....	♀	198	-----	10-10
111272.....	♀	199	-----	11-11
30423.....	♂	195	118	10-10
111271.....	♂	197	104+	10-10
111273.....	♂	189	-----	10-10
111274.....	♂	194	110	10-10
111275.....	♂	192	105+	10-10
111276.....	♂	194	110+	10-10

postoculars 2-2; the temporals are 2-2 except on both sides of two and on one side of two others, which have 2-3. Other data are given in table 24.

**MASTICOPHIS TAENIATUS TAENIATUS* (Hallowell)

A single Mexican specimen (No 46594) in the Museum is from Lake Santa María, Chihuahua.

MASTICOPHIS TAENIATUS AUSTRALIS Smith

Masticophis taeniatus australis SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 390-392, 1941.

One specimen was secured, at Tacícuaro, Michoacán (No. 111312). The Museum has one other, the type (No. 10240), from Guanajuato.

The adults of this race still remain somewhat dubious. A series of specimens from Alvarez, San Luis Potosí, recently examined, is of considerable interest (Mus. Comp. Zool. Nos. 19027-31, 19552-3, 24999-25001). There are four juveniles that are identical with the type series of *australis*; there is one juvenile typical of *ruthveni* (lacking lateral stripe); and one juvenile is about intermediate between the two color patterns; all are of about the same size. There are three adults, all typical *ruthveni*. Thus one is faced with these possibilities: Either *ruthveni* normally has two types of patterns in the young—some very distinctly striped and some unicolor as in the adults—or the Alvarez population is an intergrading one between typical *ruthveni* of the coast and another plateau race, presumably *australis*. Unfortunately, there are no considerable series of specimens from areas in which *ruthveni* might be considered typical; practically all specimens are from southern Texas, where intergradation with *schotti* occurs, or from the plateau in San Luis Potosí, where intergradation with *australis* may be indicated. Thus it is not assured that two patterns do not normally occur in the young. Nevertheless, for the present such an assumption—an unusual one—is not necessary. A more reasonable assumption is that on the plateau the young are striped (such specimens=*australis*), while on the coast they are unicolor and like the adults (= *ruthveni*); the adults of both forms are unicolor and practically indistinguishable. Thus the specimen from Zamora, Michoacán, referred by me (*op. cit.*, p. 393) to *ruthveni* seems more properly associated with *australis*, a disposition in keeping with geographical facts and in support of the present theory. While specimens now known are insufficient to assure its accuracy, they do support the premise that two races of unicolored adults occur on the plains of the southern part of the plateau and on the coast from Texas to San Luis Potosí; one (*ruthveni*) has uni-

colored young, like the adults, and occurs only on the coastal plain; the other (*australis*) has very distinctly striped young, and occurs only on the plateau; in the eastern part of the plateau intergradation of the two forms occurs.

M. t. australis accordingly remains an important link in the evolutionary history of *taeniatus*, linking *ruthveni* with *schotti* and *girardi*. Retention of the juvenile stripes in the adults led to *girardi* and *schotti*, while loss of them completely, even in juveniles, led to *ruthveni*.

MASTICOPHIS TAENIATUS GIRARDI (Stejneger and Barbour)

Masticophis taeniatus girardi SMITH, Journ. Washington Acad. Sci., vol. 31, p. 393, 1941.

One specimen (No. 105300) was collected on La Cuchilla Mountain, 5 miles south of San Pedro, Coahuila. The Museum has one other Mexican specimen, from "Chihuahua" (No. 14272).

Respectively, these specimens have 15-11, 15-12 scale rows: 205 (♀), 208 (♀) ventrals; 123⁺, 259 caudals; 2-2 preoculars and postoculars; 1-2, 2-2 temporals.

MASTICOPHIS TAENIATUS RUTHVENI Ortenburger

Masticophis taeniatus ruthveni SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 392-393, 1941.

One specimen was secured, 22 km. north of Victoria, Tamaulipas (No. 111279). The Museum has two⁵⁸ other Mexican specimens, from Soto La Marina (No. 37546) and 50 miles south of Brownsville, Tex. (No. 64681), Tamaulipas.

All are males, with 10-10 infralabials, 2-2 preoculars and postoculars, and 2-2 temporals (except on one side of one, with 2-3); respectively the scale rows are 15-12, 15-13, 15-13; ventrals 189, 197, 196; caudals 147⁺, 146⁺, ?; supralabials 8-8, 7-8, 8-8.

*MICRUROIDES EURYXANTHUS (Kennicott)

Four Mexican specimens are in the Museum, including the type (No. 1122)⁵⁹ from Sonora; another (No. 1131) bears the same data; No. 8566 is from Tiburón Island, Sonora; and No. 8850 is from Chihuahua.

⁵⁸ Ortenburger, 1923, p. 8.

⁵⁹ Kennicott, 1860, p. 337.

MICRURUS AFFINIS AFFINIS (Jan)

Three specimens were collected, one at Cuautlapan (No. 111325), one at Potrero Viejo (No. 111326), and another at Metlac (No. 111327), Veracruz. They are apparently typical, with complete black rings and very narrow, sometimes scarcely distinguishable yellow rings; the scales in the red areas are black-tipped. None of the subcaudals are entire. The anterior infralabials are black; the narrow yellow head ring passes through the middle of the parietals. The black rings cover two to three scale lengths. In all the supralabials and infralabials are 7-7, preoculars 1-1, postoculars 2-2, temporals 1-1-2; respectively the ventrals are 214, 197, 198; caudals 36 (♀), 47 (♂), 45 (♂); black rings on body and tail 12-6, 11-6, 11-5.

The Museum has four other specimens, from Orizaba, Veracruz (No. 30359); Carrizal, Veracruz (No. 46391); Tierra Caliente (No. 7089); and "Mexico" (No. 75343).

**MICRURUS AFFINIS ALIENUS* (Werner)

Three specimens in the Museum are from "Mexico" (No. 16398), and El Barrio, Oaxaca (Nos. 30521-2).

MICRURUS AFFINIS APIATUS (Jan)

Tentatively referred to this subspecies is No. 111324 from Aguacate, Chiapas. It is a female; scale rows 15-15-15; ventrals 214; caudals 37 (18 entire); supralabials and infralabials 7-7; preoculars 1-1; postoculars 2-2; temporals 1-2-2. Black bands 30 on body, 7 on tail. Total length 631 mm., tail 64 mm. Yellow bands very narrow, one-half or one-third of a scale wide, not visible on belly; black bands two or three scales wide on venter; most of the red scales on back with a black tip; red spaces on belly immaculate; head black to posterior edge of supraoculars; nuchal band including posterior tips of parietals and corner of mouth, incomplete ventrally.

The Museum has one other Mexican specimen, from Palenque, Chiapas (No. 46392).

**MICRURUS AFFINIS MAYENSIS* Schmidt

Five specimens in the Museum are from Yucatán (Nos. 6567, 24890-1, 24892), and Chichen Itzá, Yucatán (No. 46562).

**MICRURUS DIASTEMA DIASTEMA* (Duméril and Bihron)

A single specimen in the Museum (No. 67374) is from Magdalena, Jalisco.

***MICRURUS DIASTEMA DISTANS (Kennicott)**

A single specimen (No. 1144) the type, is in the Museum, from Batosegachic, Chihuahua.⁶⁰

MICRURUS DIASTEMA MICHOCANENSIS (Dugès)

A single specimen (No. 111333) was found 4 km. north of Apatzingán, Michoacán. It was captured at night, crawling on the ground near the bank of a stream. It is a male with 15 scale rows, 208 ventrals, 50 caudals, 7-7 supralabials and infralabials, 1-1 preoculars, 2-2 postoculars, 1-1-2 temporals, 7-3 black rings on body and tail.

The Museum has no others.

***MICRURUS ELEGANS ELEGANS (Jan)**

Four specimens in the Museum are from Mirador, Veracruz (Nos. 6367, 25041-3).

MICRURUS EPHIPPIFER (Cope)

Three specimens are from the state of Oaxaca: Tehuantepec (No. 111328); Cerro Arenal (No. 111329); and La Concepción (No. 111330). The specimen from Cerro Arenal was found at night with the aid of a lantern, as it crawled in the bottom of a dry arroyo. All have 15 scale rows, 7-7 supralabials and infralabials, 1-1 preoculars, 2-2 postoculars, and 1-1-2 temporals; the ventrals are 228, 213, 214, respectively; the caudals are 41 (♀), 51 (♂), 52 (♂), respectively, primary black rings on body and tail 23-5, 18-6, 19-6. The complete black rings are separated from each other by two yellow rings enclosing a red ring the dorsal part of which is all black; the black in the red areas reaches the second or third scale rows.

The Museum has two others—the type (No. 30085) from Tehuantepec and one (No. 46559) from Huilotepec, Oaxaca.

MICRURUS FITZINGERI FITZINGERI (Jan)

Micrurus fitzingeri fitzingeri BROWN and SMITH, Proc. Biol. Soc. Washington, vol. 55, pp. 63-65, 1942.

One specimen (No. 111334), found crushed in the road between Kilometers 62 and 63, 12 to 13 km. north of Cuernavaca, Morelos, well in the pine zone, has previously been described.

The Museum has two others, both from "Guanajuato" (Nos. 10231, 14432).

***MICRURUS FULVIUS TENERE (Baird and Girard)**

A single Mexican specimen is in the Museum, from Alta Mira, Tamaulipas (No. 46523).

⁶⁰ Kennicott, 1860, p. 338.

**MICRURUS LATICOLLARIS* (Peters)

A single specimen in the Museum is from a barranca near Cuernavaca, Morelos (No. 20167).

MICRURUS LATIFASCIATUS Schmidt

One specimen (No. 111323) was taken near La Esperanza, near Escuintla, Chiapas.

The Museum has no others from Mexico.

MICRURUS NIGROCINCTUS ZUNILENSIS Schmidt

Two specimens, one from La Esperanza (No. 111332), the other from Salto de Agua, Mount Ovando (No. 111331), both near Escuintla, Chiapas, are tentatively referred to this subspecies. They differ from described specimens in having the yellow bands distinct, complete about body, one and one-half scales wide; black bands on body and tail fewer, 12+3 or 4; and the prefrontals in contact with the labials (narrowly separated on one side in one).

The Museum has no others from Mexico.

**MICRURUS NUCHALIS* Schmidt

Four specimens in the Museum are from "Tehuantepec," Oaxaca (Nos. 30261-3, 32348).

**NATRIX ERYTHROGASTER TRANSVERSA* (Hallowell)

Three specimens in the Museum are from Santa Catarina, Nuevo León (No. 1314); San Diego, Nuevo León (No. 1319); and Mier, Tamaulipas (No. 46582).

NATRIX RHOMBIFERA RHOMBIFERA (Hallowell)

One specimen (No. 110511) was found in the Usumacinta River near the village pier at Emiliano Zapata (Montecristo), Tabasco. It represents the southernmost record of the genus in this continent and also presents an interesting problem with regard to its identity.

The specimen is rather typical, with the belly spotted distinctly; scale rows 27-25-20; ventrals 138; caudals 82; supralabials 8-8; infralabials 11-11; preoculars 2-2; postoculars 3-3; temporals 1-2-3. The presence of this form south as well as north of the range of *r. blanchardi* explains the specimen mentioned by Clay from La Antigua, Veracruz, which he referred with question to *r. rhombifera*, in spite of the fact that it was separated by several hundred miles from other records of the race, skipping over the entire range of *r. blanchardi*. While this distribution is not exactly orthodox, I can find no char-

acters whatever that might serve to distinguish the southern population.

The Museum has no others from Mexico.

NATRIX RHOMBIFERA BLANCHARDI Clay

One specimen referred to this form is from Huichihuayán, 42 km. north of Tamazunchale, San Luis Potosí (No. 110512). It is typical, with the belly practically unmarked; it has 25-25-20 scale rows; ventrals 141; tail broken; supralabials 8-8; infralabials 11-12; preoculars 1-1; postoculars 3-3; one anterior temporal; 22 maxillary teeth; female.

The Museum has one other specimen (No. 46533, a paratype⁶¹), from Tlacotalpam, Veracruz.

***NATRIX VALIDA** (Kennicott)

The type (No. 1309),⁶² from Durango, and one specimen (No. 31384) from Colima, are in the Museum.

NINIA DIADEMATA DIADEMATA Baird and Girard

Sixteen specimens are from the following localities: Tequeyutepec, Veracruz (Nos. 109808-10); Cuautlapan, Veracruz (Nos. 109811-22); and Piedras Negras, Guatemala (No. 109807).

Supralabials 5-5 in one, 5-6 in one, 6-6 in 14; infralabials 6-6 in 13, 6-7 in two, 7-7 in one; a small preocular split off corner of prefrontal in one; in another a small preocular wedged between labial, loreal and orbit; prefrontal separated from orbit (by contact of supraocular and loreal) on one side in one, on both sides in another; postoculars 1-1 in two, 1-2 in one, 2-2 in 13. Variation in ventral and caudal counts is given in table 25.

TABLE 25.—*Variation in Ninia diademata*

U.S.N.M. No.	Sex	Ventrals	Caudals	U.S.N.M. No.	Sex	Ventrals	Caudals
109811	♀	149	86	109810	♀	151	87
109807	♀	136	96	109820	♀	153	83
109813	♀	149	79	109821	♀	146	83
109815	♀	146	87	109812	♂	142	90
109818	♀	149	82	109814	♂	143	92
109819	♀	153	94	109815	♂	143	97
109808	♀	159	88	109817	♂	136	86
109809	♀	154	85	109822	♂	145	93

⁶¹ Clay, 1938, p. 252.

⁶² Kennicott, 1860, p. 334.

The Tequeyutepec specimens were found under stones after a short period of rains during the dry season; the Piedras Negras specimen was found at night along a trail through the forest.

The Museum has 11 other specimens, as follows: OAXACA: Tehuantepec (No. 30342); Totontepec (Nos. 20834, 46436). VERACRUZ: Jalapa (Nos. 4536-7); Mirador (Nos. 25017-8); Orizaba (No. 12122); hills west of Veracruz (No. 5316). No LOCALITY: "Mexico" (Nos. 14602, 30408).

NINIA SEBAE SEBAE (Duméril and Bibron)

Fifty-four specimens were secured, as follows: VERACRUZ: Cuautlapán (Nos. 109823-58); Tezonapa (Nos. 109870-1); Potrero Viejo (Nos. 109859-69). CHIAPAS: Palenque (Nos. 109872-5, HMS No. 8847.) In Veracruz specimens were usually found in piles of debris in banana patches. The Chiapas specimens were found in the debris

TABLE 26.—*Variation in Ninia sebae sebae*

U.S.N.M. No.	* Sex	Ventrals	Caudals	U.S.N.M. No.	Sex	Ventrals	Caudals
109863	♀	144	51	109861	♂	135	55
109864	♀	144	50	109862	♂	136	54
109865	♀	142	49	109867	♂	136	-----
109866	♀	141	45	109870	♂	137	57
109868	♀	141	53	109871	♂	132	57
8847	♀	-----	48	109823	♂	139	53
109873	♀	149	45	109872	♂	142	57
109824	♀	140	48	109874	♂	140	54
109826	♀	146	46	109875	♂	138	58
109827	♀	140	46	109825	♂	138	59
109828	♀	138	47	109829	♂	140	57
109830	♀	143	48	109831	♂	135	55
109834	♀	147	48	109832	♂	137	54
109837	♀	146	48	109833	♂	137	53
109839	♀	140	48	109835	♂	140	53
109840	♀	142	50	109836	♂	141	55
109844	♀	145	53	109838	♂	139	54
109846	♀	140	50	109841	♂	145	55
109850	♀	142	47	109842	♂	140	57
109851	♀	138	47	109843	♂	137	51
109869	♀	146	45	109845	♂	145	51
109853	♀	139	40	109847	♂	142	-----
109856	♀	139	48	109848	♂	137	55
109857	♀	143	50	109849	♂	140	57
109858	♀	143	50	109852	♂	136	62
109859	♂	138	55	109854	♂	134	52
109860	♂	136	54	109855	♂	139	57

accumulated in the axils of dead palm trees. They would occasionally flatten the head and fore part of the body when discovered.

Variation in cephalic scutellation of this series is extensive. Supralabials 6-7 in one (sixth and seventh fused), 7-8 in four, 7-7 in 48; infralabials 5-6 in one, 5-7 in one, 6-7 in four, 7-8 in two, 7-7 in forty-five; postoculars 3-3 in two, 2-3 in two, one or both fused with supraocular in four, 1-1 in two, 1-2 in two, 2-2 in forty-one; a pre-subocular (sometimes double, always minute) on one or both sides in sixteen; a small preocular split off corner of prefrontal in two. Twenty specimens are uniform red above, with no evidence of black cross bars (except that following light nuchal collar); in four others there are one or two small black spots on the body; other specimens represent intermediate conditions between this and the strongly barred phase represented by the majority of the remaining specimens.

The Museum has 11 other specimens, from "Mexico" (No. 56432), Córdoba, Veracruz (No. 30239), Mirador, Veracruz (Nos. 25019-23), and Orizaba, Veracruz (Nos. 63352-3, 12120, 12124).

***NINIA SEBAE MORLEYI** Schmidt and Andrews

Five specimens are in the Museum, from "Yucatán" (Nos. 24893-6), and Chichen Itzá, Yucatán (No. 46569).

***OPHEODRYS AESTIVUS** (Linnaeus)

The Museum has a single Mexican specimen, No. 2445, from Matamoros, Tamaulipas.

***OPHEODRYS MAYAE** (Gaige)

A single specimen in the Museum is from La Vega, Yucatán (No. 46531).

***OPHEODRYS VERNALIS BLANCHARDI** Grobman

Two specimens (No. 431) are labeled "Mexico." That the form actually occurs in the country is in doubt.⁶³

OXYBELIS ACUMINATUS (Wied)

Forty-four specimens were secured, as follows: CHIAPAS: La Esperanza, near Escuintla (Nos. 110579-84). OAXACA: Tehuantepec (Nos. 110576-8; HMS Nos. 11983, 12378, 12716-8, 12762-4, 16171-4, 18369, 18552); Tres Cruces (Nos. 110574-5; HMS Nos. 12349, 12390, 12438, 12557); Portillo Los Nanches, near El Limón, 7 leagues northwest of Tehuantepec (Nos. 110566-7); Tenango (No. 110568); Mount Guen-

⁶³ Grobman, 1941, p. 14.

gola (Nos. 110572-3; HMS Nos. 18038-40, 18042, 18044); Escurana (No. 110569); La Concepción (Nos. 110570-1); Río Grande, 12 miles north of Nilitpec (No. 110565). **TAMAULIPAS:** Hda. La Clementina, 4 miles west of Forlón (No. 105306).

The Museum has 15 other Mexican specimens, from the states of **COLIMA** (Manzanillo, No. 46606); **GUERRERO** (Acapulco, No. 46461); **NAYARIT** (María Madre Island, No. 24673; Tepic, No. 46455); **OAXACA** (Choapam, No. 46501; Tehuantepec, Nos. 30482-3, 32347); **SONORA** (Guaymas, No. 5318); **TABASCO** (No. 6627 [2]); **VERACRUZ** (Santa Lucrecia, No. 67375; Tuxpan, No. 25205); **YUCATÁN** (Chichen Itzá, No. 46565); and from "Mexico" (No. 16394).

OXYBELIS FULGIDUS (Daudin)

Six specimens were secured, all from the state of Oaxaca: Tehuantepec (Nos. 110562-3); Tres Cruces (Nos. 110560-1, HMS No. 12047); Palmar (No. 110564). Scale rows 17-13; ventrals 202, 202, 204, 203, 204, 214, respectively; caudals 156 (♂), 160 (♂), 167 (♂), 159 (♂), 163 (♂), 154 (♀); supralabials 10-10, except on one side of one (11); infralabials 10-10; preoculars 1-1; postoculars 2-2, except in one (1-1); temporals 1-2.

One of these contains a bird in its stomach.

The Museum has three other Mexican specimens, from Huilotepec, Oaxaca (No. 46603); Tapanatepec, Oaxaca (No. 30417); and Chichen Itzá, Yucatán (No. 46573).

PELAMIS PLATURUS (Linnaeus)

One specimen (No. 110414) is from Salina Cruz, Oaxaca. Nine supralabials, none touching prefrontal or entering orbit; 10 infralabials; scales in 57 rows.

The Museum has 12 other specimens: **COLIMA:** Manzanillo Bay (Nos. 51464-7). **GUERRERO:** Acapulco (No. 46415). **JALISCO:** Banderas Bay (Nos. 51468-70, 55911). **NAYARIT:** Santa Margarita Island, Tres Marías Island (No. 51078). **SINALOA:** Mazatlán (No. 51463); "Sinaloa" (No. 65833).

PITUOPHIS CATENIFER AFFINIS Hallowell

Eleven specimens were secured: **COAHUILA:** 21 miles north of Saltillo (Nos. 105301-2). **CHIHUAHUA:** 39 miles east of Carmen (No. 105291); 9 miles west of Carrizal (No. 104678); Río Santa María, near Progreso (Nos. 104681-6, 110894).

The Museum has seven⁶⁴ other Mexican specimens, six from the state of Chihuahua (Chihuahua, Nos. 14222, 14293; Casas Grandes, No. 46372; Batopilas, No. 46381), and one from "Sonora" (No. 1518).

⁶⁴ Stull, 1940, pp. 134-135.

TABLE 27.—*Variation in Pituophis catenifer affinis*

Number	Sex	Scale rows	Ventrals	Caudals	Supra- labials	Infrala- bials	Preoc- ulars	Postoc- ulars	Body and tail spots
104678	♂	29-33-23	223	61	8-8	12-12	1-1	3-3	44-11
104681	♂	27-31-22	227	59	8-8	-----	1-1	3-3	49-11
104683	♂	27-31-23	220	56	8-8	11-13	1-1	3-3	39-10
104685	♂	27-31-23	229	57	8-8	12-12	1-1	3-3	49-13
104686	♂	27-31-23	229	-----	8-8	11-?	1-1	3-4	38-?
105291	♂	27-31-23	222	62	-----	12-?	1-1	3-3	52-12
104682	♀	27-31-23	229	56	8-8	12-13	1-1	3-4	44-12
104684	♀	29-33-23	237	59	8-8	12-13	1-1	4-5	51-13
105301	♀	27-31-22	226	51	8-9	12-13	2-2	4-4	38-11
105302	♀	27-31-21	228	53	8-8	13-13	1-1	2-3	38-9
110894	♀	29-31-23	231	55	8-8	13-13	1-1	3-4	38-9

All the above specimens have four prefrontals; the fourth supralabial only enters the eye in all except two, in which the fifth also enters the orbit; in four specimens there is an azygous scale.

***PITUOPHIS CATENIFER SAYI (Schlegel)**

Eight Mexican⁶⁵ specimens in the Museum are from San Antonio, Chihuahua (No. 1519)⁶⁶; Castanuelos, Coahuila (No. 1539 [2]); Presidio del Norte, Chihuahua (No. 1542); and "Mexico" (Nos. 1415, 29347-9).

PITUOPHIS DEPPEI DEPPEI (Duméril)

Three male specimens come from Tacicuaró, Michoacán (No. 110888); Chaleo, Mexico (No. 110889); and 30 km. north of Puebla (No. 110887). Scale counts of these, in order listed, are: scale rows 27-29-21, 27-29-21, 25-28-21; ventrals 224, 216, 218; caudals 61, ?, 59; supralabials 8-?, ?-?, 8-?; infralabials 12-?, ?-?, 12-13; spots on body and tail 38-13, 30-?, 35-13. The two from Michoacán and Puebla have the posterior spots black (also the anterior), as is typical of *deppei*, but the Michoacán specimen (a juvenile measuring 437 mm. in total length) has all the spots brown, dark-edged. This condition may be typical of the young, as three other young specimens (Ada Magdalena, Durango, and "Chihuahua") have spots of similar nature.

The Museum has 12 other specimens⁶⁷ from Distrito Federal: Mexico City (No. 12731 [2]). Durango: Ada Magdalena (No. 46365). GUANAJUATO (Nos. 11355, 16442). JALISCO: Atemajac (No. 46385); Guadalajara No. 24969). MICHOACÁN: Acámbaro (No. 46557).

⁶⁵ Stull, 1940, p. 114-116.

⁶⁶ Type of *Churchillia bellona* Baird and Girard, 1852, p. 350.

⁶⁷ Stull, 1940, p. 40.

PUEBLA: Atlixco (No. 46433). SAN LUIS POTOSÍ: Jesús María (No. 46554). Two final specimens (No. 8321 [2]) bear the data "between Chihuahua and Mexico."

PITUOPHIS DEPPEI JANI (Cope)

Pituophis deppei jani SMITH, Publ. Field Mus. Nat. Hist., zool. ser. (in press).

Two very large males (No. 110890-1) were found a few kilometers north of Ixmiquilpan, Hidalgo.

The Museum has one other specimen, the type (No. 1522), from Buenavista, Coahuila.⁶⁸

PITUOPHIS DEPPEI LINEATICOLLIS (Cope)

Two specimens were secured. One (No. 110892) is from near Acultzingo, Veracruz. It is a specimen that had been dragged on the asphalt pavement by a rope held by men on a truck direct toward Orizaba, from Tehuacán. The snake had been dragged by the tail, and apparently from no great distance, since only the belly scales have been scored, and these only relatively little. In all probability the snake was killed in the vicinity of Pájaro Verde (near the crest of the pass) and dragged only from there halfway down the slope to Acultzingo, before it was cast aside on bushes by the road. It certainly could have been dragged from no greater distance than Tehuacán (some 35 km.), else the scales would have been completely mutilated and impossible to count.

In this specimen the scale rows are 27-29-21; ventrals 231; caudals 67; supralabials 9-?; infralabials 12-?; loreal 1-1; labials entering eye, fifth and sixth; no azygous scale; spots on body about 33, on tail 12; male.

The second specimen (No. 110893) is a female from San Pedro Quiéchapá, Oaxaca. Scale rows 27-27-21; ventrals 245; caudals 62; supralabials 8-8, fourth and fifth entering orbit; infralabials 11-12; preoculars 1-1; postoculars 2-3; loreals 1-1; spots on body 29, on tail 9.

The Oaxaca specimen is perfectly typical, its characters falling well within the limits of variation shown by Stull (1940, pp. 47-52, fig. 26). The Veracruz specimen, however, is not typical, and approaches the characters of *deppei deppei*. The chief differences between the two species are:

⁶⁸ Cope, 1860, p. 369; Stull, 1940, p. 41.

lineaticollis

1. Ventrals 236 to 249
2. Dorsal scales between the blotches unmarked
3. Neck stripes
4. Blotches conspicuously light-centered anteriorly as well as posteriorly, dark borders well defined and broad

deppci deppci

1. Ventrals 211 to 235
2. Dorsal scales between the blotches (and many of those involved by blotches) with a dark, median, longitudinal streak
3. No neck stripes
4. Blotches solid black anteriorly and posteriorly, light-centered medially, dark borders incomplete when present (medially)

The Acultzingo specimen has 231 ventrals, as in *d. deppci*, and the dorsal scales have longitudinal dark streaks, giving much the general appearance of *d. deppci*. In these two characters it is unquestionably referable to the latter race. In the more important characters of the neck stripes and light-centered dark-edged blotches, however, it is unquestionably referable to *lineaticollis*. In view of the fact that the specimen probably comes from an area between the known peripheral range of *lineaticollis*, and the known central plateau range of *d. deppci*, intergradation between these two is very strongly indicated. It is possible that a race distinct from either *lineaticollis* or *deppci deppci* is represented, but if so, it still would occupy a position linking *deppci* and *lineaticollis*. The latter possibility is not very great, since typical *deppci* is known from the Tehuacán desert basin (Cacaleapam, Puebla; see Taylor, 1940, p. 463) as well as from Jalapa, Veracruz (type locality).

The Museum has four other specimens,⁶⁹ from Guerrero (Acahuitzotla, No. 46537; Omilteme, No. 46162) and unknown localities (Nos. 30506, 32220).

***PLIOCERCUS BICOLOR** Smith

A single specimen, the type, is in the Museum, from Tuxpan, Veracruz (No. 25203).⁷⁰

PLIOCERCUS ELAPOIDES ELAPOIDES Cope

Pliocercus elapoides elapoides SMITH, Proc. Biol. Soc. Washington, vol. 54, pp. 119-120, 1941.

Four specimens were collected, at Potrero Viejo, Veracruz (No. 110063), and Cuautlapan, Veracruz (Nos. 110764-6). The Museum has six others, from Orizaba (Nos. 4383, 6323, 12125) and Mirador (Nos. 6368, 25029-30), Veracruz; and in addition an intergrade between this and *diastemus*, from an unknown locality, possibly Santa Efigenia, Oaxaca (No. 62088).

⁶⁹ Stull, 1940, p. 51.

⁷⁰ Smith, 1941p, pp. 123-124.

PLIOCERCUS ELAPOIDES DIASTEMUS (Bocourt)

Pliocercus elapoides diastemus SMITH, Proc. Biol. Soc. Washington, vol. 54, pp. 120-121, 1941.

Seven specimens, from various localities near Escuintla, Chiapas, were secured: Cerro Ovando, 6,500 feet (No. 110768); La Esperanza (Nos. 110772-3, HMS No. 17148); Cruz de Piedra (Nos. 110770-1); and Rancho Las Gradass (No. 110769). Those I observed in the field were crawling about during the day.

The Museum has two others, from Chicharras, Chiapas (Nos. 46437-8).

PLIOCERCUS ELAPOIDES LATICOLLARIS Smith

Pliocercus elapoides laticollaris SMITH, Proc. Biol. Soc. Washington, vol. 54, pp. 122-123, 1941; vol. 55, pp. 159-160, 162, 164, 1942.

One specimen, the type (No. 110767), is from Tenosique, Tabasco. The Museum has no other specimens.

***PSEUDOFICIMIA FRONTALIS (Cope)**

Three specimens are in the Museum, one from Guadalajara, Jalisco (No. 24961), and two (cotypes) from "Colima" (Nos. 31424-5).⁷¹

***PSEUDOLEPTODEIRA LATIFASCIATA (Günther)**

A single specimen (No. 46550) is in the Museum, from Piaxtla, Puebla.

PSEUSTES POECILONOTUS ARGUS (Bocourt)

Five specimens were collected, one (No. 110516) from near Palenque, Chiapas, the others (Nos. 110517-20) from Piedras Negras, Guatemala.

Two of these are young, No. 110519 measuring 822 mm. in total length (tail 224 mm.), the other dried and broken; both have the pattern of *lunulatus* and in this feature do not resemble adult *argus* in the least. This type of pattern, however, seems to be typical of young *poecilonotus*, as it occurs in *p. poecilonotus* as well as in *p. argus*, and is closely matched in the young of *p. shropshirei*. A sub-adult of *p. argus* from Santo Domingo, Oaxaca (No. 46502) gives evidence of the transition from the juvenile *lunulatus* type of pattern to the adult *argus* pattern.

The Museum has three other Mexican specimens, from Mirador, Veracruz (No. 6373, locality open to question, as the catalog is blank; this data given by a label in jar); mountains near Santo Domingo, Oaxaca (No. 46502); "Tierra Caliente" (No. 7096). The last specimen

⁷¹ Taylor and Smith, 1942a, pp. 243-246.

is identified as *p. poecilonotus* by Amaral (1929, p. 312), but this form occurs in Mexico only in the Yucatán Peninsula, from which the specimen probably did not originate. It is a juvenile, with the *lunulatus* pattern; present specimens show that this pattern is not confined to *p. poecilonotus* as previously thought. In fact, the young of *p. argus* and *p. poecilonotus* are practically inseparable.

TABLE 28.—Variation in *Pseustes poecilonotus argus*

U.S.N.M. No.	Sex	Scale rows	Ventrals	Caudals	Infralabials	Max. teeth
110516----	♂	21-23-15	207	135	12-12	20
110517----	♂	23-23-15	208	134	13-13	21
110518----	♂	21-23-15	208	129	13-13	-----
110519----	♂	21-23-15	209	135	13-14	22
110520----	♀	22-24-15	215	128	14-?	19

RHADINAEA AEMULA Bailey

One specimen (No. 110373) is from Kilometer 58, near Tres Cumbrés, Morelos, collected by E. H. Taylor and H. M. Smith. It is a female, with 169 ventrals, 106 caudals, 8-8 supralabials, 10-10 infralabials, a presubocular present.

The Museum has no others.

RHADINAEA CRASSA Smith

PLATE 32, FIGURE 1.

Rhadinaea crassa SMITH, Proc. Biol. Soc. Washington, vol. 55, pp. 190-191, pl. 3, figs. 4, 5, 1942.

One specimen, a paratype (No. 110366), is from Barranca de los Horcones, 10 km. south of Durango, Hidalgo. It is a badly crushed specimen found in the road.

The Museum has no others.

RHADINAEA DECORATA (Günther)

PLATE 32, FIGURE 3.

Sixteen specimens are from the following localities in Veracruz: Peñuela (Nos. 110362-3). Cuautlapan (Nos. 110354-61): Potrero Viejo (Nos. 110348-53). One of the specimens from Peñuela contained a *Bolitoglossa rufescens* in its stomach.

The infralabials are 9-9 in one; one preocular on both sides in one, on one side in another; three preoculars on one side in one. Variation in caudal and ventral counts is given on the accompanying table.

TABLE 29.—*Variation in Rhadinaea decorata*

U.S.N.M. No.	Sex	Ventrals	Caudals	U.S.N.M. No.	Sex	Ventrals	Caudals
110350	♀	124	111	110359	♀	124	107
110356	♀	127	109	110353	♀	129	112
110363	♀	128	104	110355	♀	128	-----
110357	♀	123	-----	110351	♂	123	119
110358	♀	125	102	110354	♂	124	121
110349	♀	126	100	110348	♂	119	-----
110361	♀	129	-----	110352	♂	121	-----
110360	♀	134	112	110362	♂	121	122

The Museum has six other specimens from Mexico—two from "Mexico" (Nos. 12096, 30409), three from near Santo Domingo, Oaxaca (Nos. 46361-3), and one from Ocuilapa, Chiapas (No. 46527).

RHADINAEA FORBESI Smith

Rhadinaea forbesi SMITH, Proc. Biol. Soc. Washington, vol. 55, pp. 188-189, pl. 3, fig. 3, 1942.

The type series of three specimens, from Tequeyutepec, Veracruz (Nos. 110361-3, HMS No. 13211), are in the collection. They were found under stones in a grassy area in the mountains, after a spell of rain in the dry season.

The Museum has one other (No. 29121) from an unknown locality.

RHADINAEA FULVIVITTIS Cope

PLATE 32, FIGURE 2

A single specimen (No. 110347) is from Cerro San Felipe, Oaxaca, collected by E. H. Taylor. It is a male, with 159 ventrals, 98 caudals, 8-8 supralabials, 10-10 infralabials, and presubocular present.

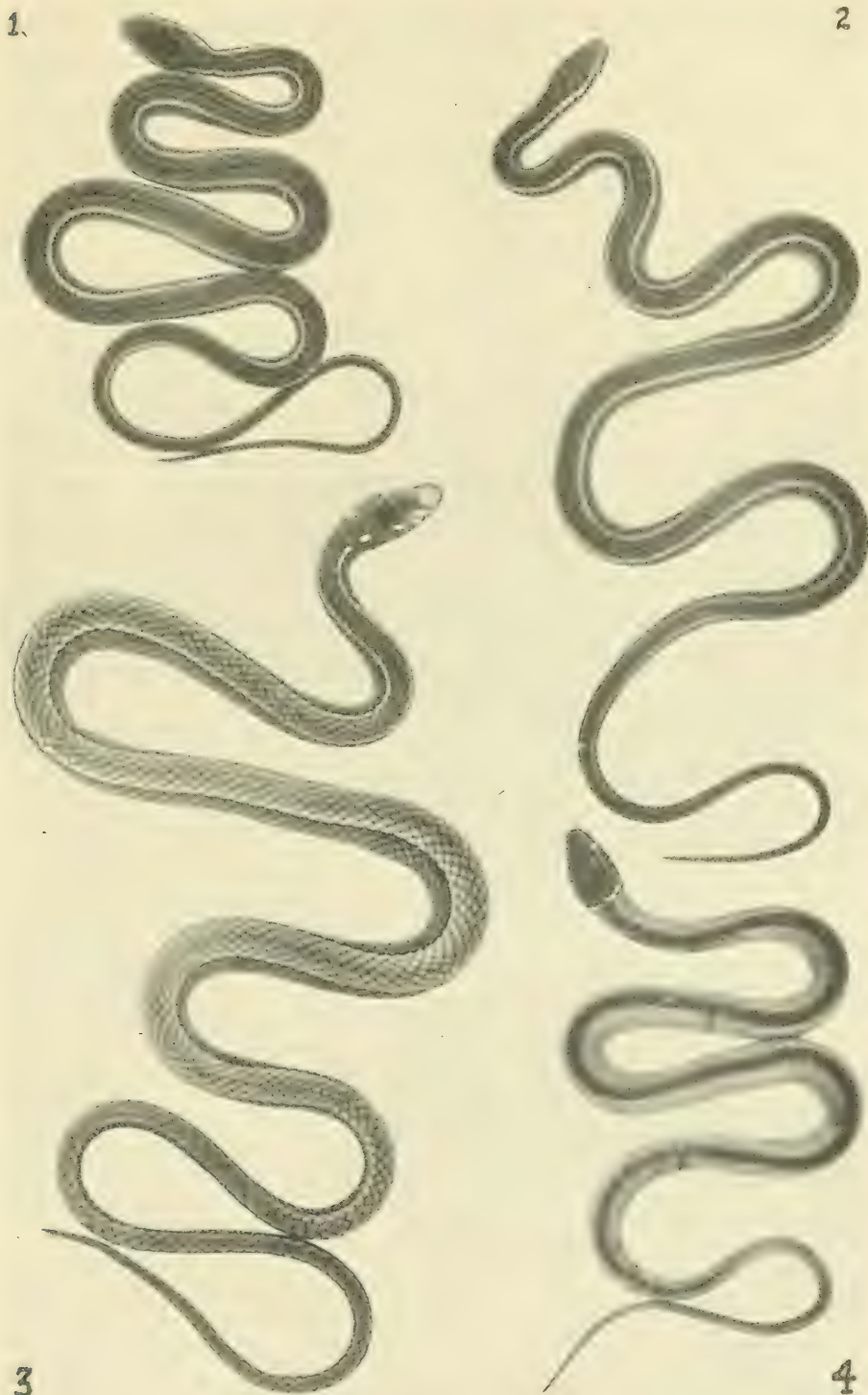
The Museum has three⁷² other specimens, two from Orizaba (Nos. 7075, the type, and no. 6333), and one (No. 46434) from Mount Zempoaltepec, Oaxaca.

*RHADINAEA HESPERIA HESPERIOIDES Smith

Three specimens⁷³ are in the Museum, from "Guanajuato" (No. 15130), Magdalena, Jalisco (No. 67373), and Plomosos, Sinaloa (No. 46456). As noted elsewhere (Smith, *loc. cit.*) the locality for the first specimen is probably erroneous.

⁷² Bailey, 1940, p. 11.

⁷³ Smith, 1942b, pp. 186-187, pl. 3, fig. 1.



- 1, *Rhadinaea crassa*, EHT-HMS No. 5526, from Durango, Hidalgo.
- 2, *Rhadinaea fulvivittis*, EHT-HMS No. 5524, from Cerro de San Felipe, Oaxaca, Oaxaca.
- 3, *Rhadinaea decorata*, EHT-HMS No. 5530, from Potrero Viejo, Veracruz.
- 4, *Rhadinaea laureata*, EHT-HMS No. 5527, from Lake Pátzcuaro, Michoacán.

***RHADINAEA HESPERIA HESPERIA** Bailey

Two specimens are in the Museum, from "Guanajuato" (No. 15429) and Cuernavaca, Morelos (No. 20166).

RHADINAEA LACHRYMANS (Cope)

Four specimens (Nos. 110367-9, HMS No. 14789), all females, were secured on Mount Ovando, Chiapas, at elevations between 5,200 and 6,500 feet. All were found under or in rotten logs. There is but one preocular in all; ventrals and caudals, respectively, in the order listed: 175 and 71; 172 and 78; 170 and 72; 168 and 76.

The Museum has no others of the species.

RHADINAEA LAUREATA (Günther)

PLATE 32, FIGURE 4

Three specimens (Nos. 110370-2) are from a locality 5 miles south of Carapa, Michoacán. All were found under logs. One specimen contained a *Sceloporus scalaris*. The scutellation of the head is normal; ventrals and caudals, respectively, in the order listed, ♂ 159 and 90; ♂ 157 and 92; ♀ 164 and 79.

The Museum has no others of the species.

RHADINAEA OMILTEMANA (Günther)

One specimen, a topotype, collected by E. H. Taylor (No. 110374), is from Omilteme, Guerrero. It is a male, with 151 ventrals, 87 caudals, 8-8 supralabials, 10-10 infralabials, 2 pre- and 2 post-oculars, temporals 1-2-3. Color as described and figured by Bailey (1940, pp. 13-14, pl. 2, fig. 2).

The Museum has no others of the species.

***RHADINAEA QUINQUELINEATA** Cope

A single specimen, the type, is in the Museum, from Tezuitlán, Puebla (No. 31350).⁷⁴

RHADINELLA SCHISTOSA Smith

Rhadinella schistosa SMITH, Copeia, 1941, pp. 7-10, fig. 1.

A single specimen, a paratype (No. 109914), is from Cuautlapan, Veracruz.

This genus shows a relationship with *Trimetopon* as well as with *Rhadinaea* and *Diadophis*. From the former it differs in having more numerous maxillary teeth, and thus a longer maxillary bone. The

⁷⁴ Cope, 1886, p. 277; Smith, Publ. Field Mus. Nat. Hist., zool. ser. (in press).

teeth in *Rhadinella* number 16 and 17, while in two *Trimetopon* examined they are 11 to 13. *Rhadinaca* has 16 to 22 teeth in Mexico; thus *Rhadinella* would appear closer to that genus in this character. Another difference is the character of the hemipenial spines, which are perfectly straight in *Rhadinella*, hooked in both *Trimetopon* and *Rhadinaca*. Finally, the tail is extremely short in *Rhadinella*, with 42 or fewer caudals, while in *Trimetopon* and *Rhadinaca* the subcaudals are 58 or more.

The Museum has no others of the species.

*RHINOCEILUS ANTONII ANTONII Dugès

A single specimen in the Museum is from Culiacán, Sinaloa (No. 46370).

SALVADORA BAIRDII Jan

Ten specimens were secured, from the following localities: GUANAJUATO: Acámbaro (No. 109244). MICHOACÁN: Tacicuaró (Nos. 109236-42). PUEBLA: 20 km. south of Puebla (No. 109235). VERACRUZ: El Limón (No. 109243).

On two occasions specimens were startled in brush, whereupon they raced away with considerable noise, stopping abruptly a few yards away. In both cases the snakes stopped within gunshot, and in spots where they could be seen without change in my own position.

In eight specimens examined, the maxillary teeth are 9-3, with the exception of No. 109240, in which they are 10-3. The posterior chin shields are closely approximated, usually in partial contact. In one specimen the preocular is single, and in another there are three post-

TABLE 30.—*Variation in Salvadoria bairdii*

U.S.N.M. No.	Sex	Ventrals	Caudals	Supra- labials	Infra- labials	Row reduction	
						17-15	15-13
109242	♀	200	99	8-8	11-11	120-117	142-138
109238	♀	201	-----	8-8	10-10	125-123	127-126
109235	♀	188	87	8-8	10-10	111-112	121-123
109244	♀	200	103	8-8	10-10	116-?	144-140
109236	♂	193	103	8-8	10-?	115-?	?-?
109240	♂	194	-----	8-8	10-10	124-124	135-138
109241	♂	195	87	8-8	10-10	121-120	143-143
109237	♂	197	-----	8-8	10-?	127-127	145-141
109239	♂	195	101	8-8	9-9	109-108	124-125
109243	♂	198	101	8-8	9-9	110-108	156-155

oculars; in all others the preoculars and postoculars are 2-2. Loreal single in all; antepenultimate labial in contact with postoculars in all; and anterior section of nasal separated from second supralabial in all. Supraanal keels are present in adult males.

The National Museum has five other specimens, from Orizaba, Veracruz (No. 30495); San Cristóbal, Jalisco (No. 46419); Guanajuato (No. 9883); "between Mexico City and Chihuahua" (No. 8325); and "Jalisco" (No. 56576).

***SALVADORA BOGERTI** Smith

A single specimen, the type, is in the Museum, from Tehuantepec, Oaxaca (No. 30296).⁷⁵

***SALVADORA GRAHAMIAE** Baird and Girard

Two specimens from Mexico are in the Museum, from Presidio del Norte, Chihuahua (No. 2080), and from "Sonora" (the type, No. 2081).⁷⁶

***SALVADORA HEXALEPIS HEXALEPIS** (Cope)

Two specimens from Mexico are in the Museum, from "Sonora" (No. 2082) and Sierra Blanca, Sonora (No. 43187).

***SALVADORA HEXALEPIS CELERIS** Smith

A single specimen, the type (No. 40043), is in the Museum, from San Blas, Sinaloa.⁷⁷

SALVADORA HEXALEPIS DESERTICOLA Schmidt

Six specimens were collected, all near the Río Santa María, near Progreso, Chihuahua (Nos. 104668-73).

Preoculars 1-2 in one, and 2-2 in the remainder; postoculars 2-2 in all; loreal single in all; anterior section of nasal contacts second labial in all; antepenultimate supralabial contacts postoculars in all.

The Museum has eight others from Mexico, all from the state of Chihuahua: "Chihuahua" (Nos. 14255, 14295); Lake Santa María (No. 46593); Batopilas (No. 46505); Balleza (No. 46504); Casas Grandes (Nos. 46375-6); and Chihuahua City (No. 46451).

⁷⁵ Smith, 1941b, pp. 2-6, figs. 1-2.

⁷⁶ Baird and Girard, 1853, p. 104; Schmidt, 1940, pp. 144-145.

⁷⁷ Smith, 1941b, pp. 9-11.

TABLE 31.—*Variation in Salvadora hexalepis deserticola*

U.S.N.M. No.	Sex	Ventrals	Caudals	Supralabials	Infralabials	Row reduction	
						17-15	15-13
104671	♀	188	68	9-9	11-11	129-129	156-153
104670	♀	191	73	9-9	10-11	143-147	162-166
104673	♀	190	72	9-9	10-10	125-127	149-149
104672	♀						
104669	♂	186	76	9-9	10-11	122-123	146-141
104668	♂	189	79	9-9	10-11	131-133	162-162

The specimen from Galeana has 10-3 maxillary teeth; the anterior section of the nasal is in contact with the second supralabial in both; the antepenultimate supralabial is in contact with the postoculars except on one side of one.

The Museum has no others of the species from Mexico.

SALVADORA INTERMEDIA INTERMEDIA Hartweg

Salvadora intermedia HARTWEG, Copeia, 1940, pp. 256-259.

One specimen (No. 109228) is from Chilpancingo, Guerrero, collected by W. W. Brown. This is a paratype (originally Univ. Mich. Mus. Zool. No. 85726) and is discussed in the original description.

The specimen is a unique in the Museum collections.

SALVADORA LEMNISCATA (Cope)

Twenty specimens were collected, at the following localities: OAXACA: Mixtequilla, 3 miles northwest of Tehuantepec (Nos. 109253-5); Tehuantepec (city) (Nos. 109259-64); Tres Cruces, about 40 km. northwest of Tehuantepec (Nos. 109256-8); Yerba Santa, foot of Mount Guengola, 15 miles northwest of Tehuantepec (Nos. 109247-8); Cerro Arenal, 30 km. northwest of Tehuantepec (No. 109251); Escurana, 15 km. northwest of Tehuantepec (No. 109250); El Limón, 35 km. northwest of Tehuantepec (No. 109252); near Lachiguirí (No. 109249). CHIAPAS: Tonalá (Nos. 109245-6).

The preoculars are invariably single, the postoculars invariably double. The frontal is in contact with the preocular on both sides in eight, on one side in three. Other variation in scutellation is given in the accompanying table.

The Museum has no other specimens.

TABLE 32.—*Variation in Salvadora lemniscata*

U.S.N.M. No.	Sex	Ventrals	Caudals	Supralabials	Infralabials	Labials enter eye
109255	♂	197	-----	9-9	12-12	4-5, 4-5-6
109253	♂	207	139+	9-9	11-12	4-5-6
109264	♂	201	142+	9-9	11-12	4-5-6
109262	♂	202	-----	9-9	12-13	4-5-6
109258	♂	205	-----	9-9	12-12	4-5-6
109250	♂	197	136+	9-9	12-13	4-5-6
109252	♂	202	131+	9-9	13-13	4-5-6
109245	♂	203	-----	9-9	12-12	4-5
109254	♀	203	136	8-9	11-12	4-5, 4-5-6
109263	♀	198	137	9-9	12-12	4-5-6
109259	♀	201	-----	8-9	11-11	4-5, 4-5-6
109261	♀	200	133	9-9	11-12	4-5-6
109260	♀	198	134	9-9	11-11	4-5-6
109256	♀	202	139+	9-9	11-12	4-5-6
109257	♀	199	-----	9-9	12-12	4-5-6
109247	♀	206	-----	9-9	12-12	4-5-6
109248	♀	206	-----	9-9	11-12	4-5, 4-5-6
109251	♀	200	144	9-9	12-12	4-5, 4-5-6
109249	♀	205	141	9-9	11-12	4-5-6
109246	♀	199	-----	9-9	11-11	4-5-6

SALVADORA LINEATA Schmidt

Two specimens were collected, one (No. 105304) 17 miles west of Santa Caterina, Nuevo León, the other (No. 109233) 15 miles west of Galeana, Nuevo León. The former was found crawling on the highway, the latter under a rock shortly after a rainstorm.

TABLE 33.—*Variation in Salvadora lineata*

U.S.N.M. No.	Sex	Ventrals	Caudals	Supra- labials	Infra- labials	Row reduction		Preoc- ulars	Postoc- ulars
						17-15	15-13		
105304	♀	180	-----	8-8	10-11	111-109	127-125	2-3	2-2
109233	♂	183	97	8-8	10-11	132-133	157-153	2-2	2-3

SALVADORA MEXICANA (Duméril and Bibron)

One specimen (No. 109234) was collected 4 km. north of Apatzingán, Michoacán, on March 15, 1939. This specimen was discovered in a fence formed of loose rocks, with the body concealed and a small portion of the neck protruding straight up from the top of the fence, the head turned toward me as I approached. The snake made no movement, and it was quite by accident that I saw it. The stomach contained a *Sceloporus pyrrhocephalus* and a *Uta gadovi*.

Male, ventrals 183; caudals 127; supralabials 9-9; infralabials 11-11; preoculars 1-1, postoculars 2-2; temporals 2-1-2, 2-2; 4th, 5th, and 6th supralabials enter orbit.

The Museum has 14 other specimens, from the states of Colima (Colima, Nos. 31618-9, 31621-2, 61966-9; Manzanillo, Nos. 31620, 46607, 61970), Guerrero (Acapulco, No. 46341), Guanajuato (Tupátaro, No. 16230), and Michoacán (Huetamo, No. 31077).

***SIBON BREVIFACIES (Cope)**

Two specimens are in the Museum, one the type (No. 24886)⁷⁸ and another (No. 6562) from the same locality, Yucatán.

SIBON DIMIDIATUS (Günther)

Five specimens (Nos. 109903-6, HMS No. 7311) were secured at Piedras Negras, Guatemala. They were most frequently found under loose bark of fallen trees. One is in too poor condition for scale counts to be made.

The supralabials are 8-9 in one, 8-8 in the others; infralabials 9-9 in one, 9-10 in two, 10-11 in one; preoculars none in two, 1-1 in one (loreal split vertically), 2-2 in one (loreal split, and in addition a small scale split off lower corner of prefrontal); prefrontal entering orbit in all; temporals 1-2; dark body bands 24 to 31, tail bands 17 to 19.

The young are considerably different in coloration from the adults. The young were described in the field as follows: All light areas of head dark orange (burnt sienna); lower sides of head white, dorsal areas of light body bands dark orange; these areas not so broad anteriorly (2 scales), broader posteriorly (5 to 7 scales); sides of light bands, belly and tail pure white. In the single adult specimen the dark bands are light brown, with a black border; the light bands are heavily stippled with black on the 11 median scale rows, nearly white on the two outer rows. The belly is also stippled somewhat. The Museum has no others of the species.

Ventrals and caudals, respectively, in No. 7311, 191, 122; No. 109903, 189, 111; No. 109905, 200, 124; No. 109906, 194, 126.

***SIBON NEBULATUS (Linnaeus)**

A single specimen (No. 7100) in the Museum is from Tierra Caliente, Mexico.

***SIBON SANNIOLUS (Cope)**

Three specimens are in the Museum, Nos. 6564 (type)⁷⁹ and 24888 from "Yucatán," and No. 46568 from Chichen Itzá, Yucatán.

⁷⁸ Cope, 1866, p. 127.

⁷⁹ Cope, 1867b, p. 318.

**SISTRURUS CATENATUS TERGEMINUS* (Say)

A single specimen in the Museum bears the locality "Sonora" (No. 506). This was probably taken in an area now included in Arizona.

SISTRURUS RAVUS (Cope)

Eleven specimens are in the collection, eight of which were removed from the uteri of one of the three adults secured; the latter are from Cacaloapam, Puebla (No. 110594), El Limón Totalco, Veracruz (No. 110595), and Puente Colorada, Veracruz (No. 110596); the last named is the one with the young, and the other two are males. The scutellation of the adults, in the order numbered, follows: scale rows 21-21-17, 23-21-17, 25-21-17; ventrals 144, 142, 147; caudals 26, 26, 29; supralabials 11-11; infralabials 11-11, 10-10, ?-?; spots on body 28, 33, ?; spots on tail 4 in all.

The Museum has six others, from localities as follows: OAXACA: Totontepec (Nos. 46555, 46609). PUEBLA: Chalchicomula (No. 46352); Rinconada (No. 46351). VERACRUZ: South Table Land (Nos. 25050-1).

**SONORA SEMIANNULATA SEMIANNULATA* Baird and Girard

A single specimen in the Museum bears the locality "Sonora" (No. 2109, type.⁸⁰ This was probably taken in an area now included in Arizona.

**SONORA SEMIANNULATA BLANCHARDI* Stickel

A single Mexican specimen in the Museum is from Lake Santa María, Chihuahua (No. 46591).

SPILOTES PULLATUS MEXICANUS (Laurenti)

Eight specimens are as follows: CHIAPAS: La Esperanza (Nos. 110589-92); Cruz de Piedra (Nos. 110587-8); Finca Juárez (No. 110586). VERACRUZ: Xuchil, near Paraje Nuevo (No. 110593). All the Chiapas localities are in the vicinity of Escuintla. One specimen was found in a palm tree, chasing a rat. Others were seen on the ground; one was attempting to crawl up the trunk of a large tree.

The Museum has nine other specimens as follows: MEXICO: Tamaulipas (Alta Mira, No. 46387). VERACRUZ: Mirador (Nos. 25004-6); Orizaba (No. 6320); Santa María (No. 46543); hills west of Veracruz (No. 5312). CHIAPAS: Huehuetán (No. 64546); "Mexico" (No. 12098). A juvenile is marked as the adult.

⁸⁰ Baird and Girard, 1853, p. 117.

TABLE 34.—*Variation in Spilotes pullatus mexicanus*

U.S.N.M. No.	Sex	Scale rows	Ventrals	Caudals	Supralabials	Infralabials	Preoculars	Postoculars	Temporals	Loreals
110586	♀	17-18-12	218	126	8-8	9-9	1-1	2-2	1-1	1-1
110587	♀	17-18-14	217	130	8-8	10-10	1-1	2-2	1-1	0-0
110588	♀	17-18-12	215	130	8-8	9-9	1-1	2-2	1-1	1-1
110589	♀	17-18-14	218	134	8-8	10-10	1-1	2-2	1-1	0-0
110590	♀	17-18-14	218	136	8-8	8-9	1-1	2-2	1-1	1-1
110592	♀	17-18-14	215	130	8-8	8-8	1-1	2-2	1-1	1-1
110591	♂	16-18-14	207	130	8-8	9-9	1-1	2-2	1-1	1-1
110593	♂	16-18-12	205	-----	7-7	8-8	1-1	2-2	1-1	1-1

***STENORHINA DEGENHARDTII MEXICANA (Steindachner)**

Ten specimens are in the Museum, from "hills west of Veracruz," Veracruz (Nos. 5313-4); Orizaba, Veracruz (No. 6322 [2]); Mirador, Veracruz (Nos. 25013-6); "Mexico" (No. 12086); Tehuantepec, Oaxaca (No. 30416). The latter probably is not from Oaxaca, as no other specimens are recorded from Pacific slopes; if the "Isthmus of Tehuantepec" is intended, then the Atlantic slopes are implied, and therefore, probably the state of Veracruz.

STENORHINA FREMINVILLII FREMINVILLII Duméril and Bibron

Two specimens (Nos. 110513-4) are from San José Lachiguiri, Oaxaca (20 km. southeast of Miahuatlán). Ventrals 174, 162, respectively; caudals 32 (♀), 40 (♂); supralabials 7-7; infralabials 7-7; preoculars 1-1; postoculars 2-2; temporals 1-2; loreal 0-0; nasal broadly in contact with preocular. Ground color gray; five dorsal black lines; belly white, unpigmented; a black temporal stripe.

The Museum has four others, from Guichicovi, Oaxaca (No. 30090), Tehuantepec, Oaxaca (No. 31415), and "Mexico" (No. 11374 [2]).

***STENORHINA FREMINVILLI APIATA Cope**

Six Mexican specimens are in the Museum, from El Barrio, Oaxaca (No. 70405, type),⁶¹ Chichen Itzá, Yucatán (Nos. 46396, 46563-4), and Córdoba, Veracruz (Nos. 30518-9). The locality for the last is probably erroneous, as there is no other indication that the race occurs west of the Isthmus of Tehuantepec.

STENORHINA FREMINVILLII LACTEA Cope

One specimen (No. 110515) is from the vicinity of Tehuantepec, Oaxaca. It is a female, with 178 ventrals, 31 caudals, 7-7 infralabials

⁶¹ Cope, 1876, p. 142.

and supralabials, 1-1 preoculars, 2-2 postoculars, 1-1 loreals; latter broadly in contact with preocular and nasal. Ground color red; a black temporal stripe; a very distinct median stripe and on each side two very indistinct, irregular dark stripes (in same position as stripes of typical *f. freminvillii*); belly white, unpigmented.

The Museum has a single specimen, from Tehuantepec, Oaxaca (No. 30414).

***STORERIA DEKAYI DEKAYI (Holbrook)**

Two Mexican specimens in the Museum are from Matamoros, Tamaulipas (No. 7279 [2]).

STORERIA DEKAYI ANOMALA Dugès

One specimen (No. 110328) was secured at Tequeyutepec, Veracruz. It was found under a stone on a grassy slope in the mountains west of Jalapa, after a period of rains in the middle of the dry season.

To this subspecies are referred four other specimens in the Museum: Nos. 7081, 8939, Orizaba, Veracruz; No. 5565, Jalapa, Veracruz; and No. 32148, Jicaltepec, Veracruz. All except one of the six Veracruz specimens have the anterior chin shields transversely divided, producing three pairs of chin shields. No. 110328 has 17 scale rows, 139 ventrals, divided anal, 50 subcaudals, 7-7 supralabials and infralabials, 1-1 preoculars, 2-2 postoculars, and 1-3 temporals.

STORERIA STORERIOIDES (Cope)

Three specimens, from the following localities: 10 miles west of Villa Victoria, Mexico (No. 110327); Llano Grande, 5 miles west of Río Frío, Mexico (Nos. 110325-6). They were found under logs in high mountains (approximately 10,000 feet). Ventrals and caudals, respectively, in the order given, 128, 39 (♀); 135, ? (♀); 136, 45 (♀). Supralabials and infralabials 7-7 in all; oculars 2-2 in all; loreal present and temporals 1-2 in all.

The Museum has six others—the cotypes from "Mexico plateau between the eastern range and the Valley of Mexico" (Nos. 24987-90); Guadalajara, Jalisco (?) (No. 29125); mountains near Jesús María, San Luis Potosí (No. 46428).

Three specimens examined recently from Chilpancingo, Guerrero, do not seem notably different from the central plateau populations. They are F. M. N. H. Nos. 38346-7 and M. C. Z. No. 42663. Respectively these have ♂ 122, ♀ 132, ♀ 131 ventrals; 48 (+ ?), 40, 40 caudals; 7-?, 8-?, 7-7 supralabials; ?-?, 8-?, 7-7 infralabials; 2-2 postoculars and preoculars; 1-2 temporals; 1-1 loreals; 261 mm., 194 mm., 269 mm. total length; 56 mm., 40.5 mm., and 51 mm. tail length.

*SYMPHIMUS LEUCOSTOMUS Cope

Two specimens are in the Museum, from Chihuitán, Oaxaca (No. 30310),⁸² and from "Oaxaca" (No. 30311).

*SYMPHOLIS LIPPIENS Cope

Two specimens (Nos. 31345-6) are in the Museum, from "Southwestern Mexico."

TANTILLA CALAMARINA Cope

One specimen (No. 110386) from 8 km. northwest of Cuernavaca, Morelos. Found under a stone in an ancient lava flow.

Preocular very minute; prefrontals and second supralabial broadly in contact; second supralabial narrowly entering orbit on one side; temporal broadly separated from single postocular; mental in contact with chin shields; ventrals 130, caudals 27 (female).

The Museum has three others, from Mazatlán, Sinaloa (No. 6834, type of *bimaculata*⁸³), Guadalajara, Jalisco (No. 6600, type of *calamarina*⁸⁴), and Valley of Mexico and Toluca (No. 32290).

*TANTILLA CANULA Cope

Three specimens, cotypes, in the Museum are from "Yucatán" (Nos. 24880-2).⁸⁵

TANTILLA BOCOURTI (Günther)

Three specimens were secured: No. 110395, La Virgin, 22 km. north of Tehuacán, Puebla; No. 110396, 8 km. northwest of Cuernavaca, Morelos; and No. 110397, 5 miles south of Carapa, Michoacán.

In the smallest (No. 110397) the nuchal light collar crosses the tips of the parietals; in the other two the collar borders the posterior edges of the parietals. Two tiny, juxtaposed pineal light spots in two (Nos. 110395, 110397); an irregular, small light spot at anterior edge of parietal; a light spot on anterior edge of supraocular faintly visible; a larger light spot on each internasal; a middorsal dark stripe very faintly indicated in two (Nos. 110395, 110397). The young specimen is considerably darker above than the other two. The Cuernavaca specimen is more flesh-color above, while the Tehuacán specimen is light gray. There is faint evidence of pigment on the lower labials.

The secondary temporal is scalelike (about as long as broad), the sixth labial is higher than the fifth; the first infralabials are in contact medially; the frontal is broadest in the Michoacán specimen

⁸² Cope, 1869, p. 150; Gaige, 1936, p. 300.

⁸³ Cope, 1867b, p. 320.

⁸⁴ Cope, 1876, p. 143.

⁸⁵ Cope, 1876, p. 144.

(1.5×2 mm.), narrowest in the Tehuacán specimen (1.7×2.6 mm.); the sides of the frontal are convergent posteriorly in the latter specimen, parallel in the other two. A loreal is present on one side in one (No. 25032, Mirador, split off the preocular) and on both sides of another (No. 110396, split off the prefrontals).

The Museum has two other specimens (Nos. 25032-3), from Mirador, Veracruz.

Ventrals and caudals, respectively, in No. 110395, 164, 57 (♂); No. 110396, 181, 49 (♀); No. 110397, 180, 57 (♂); No. 25032, 179, 61 (♂); No. 25033, 179, 65 (♂).

TANTILLA JANI (Günther)

Two specimens (Nos. 110377-8) were secured at La Esperanza, Chiapas. One was found during the dry season (April 12) in a rotten log. The other was routed from its hiding quarters under leaves during the day in the wet season (June 3). Both are females, with 154 and 150 ventrals, 45 and 44 caudals, respectively. The dorsal stripe is confined to the vertebral scale row; all scales in that row are dark-edged posteriorly.

The Museum has no others of the species.

***TANTILLA MINIATA Cope**

A single specimen (No. 25031) in the Museum is from Mirador, Veracruz.⁸⁶

***TANTILLA MOESTA (Günther)**

Two specimens in the Museum are from Yucatán (Nos. 6565, 24883).

TANTILLA NIGRICEPS NIGRICEPS Kennicott

Tantilla nigriceps nigriceps SMITH, Zoologica, vol. 27, p. 38, 1942.

One specimen (No. 104674) is from Río Santa María, Chihuahua (near Progreso). Ventrals 158 (female), tail injured. Black cap of head pointed posteriorly, the apex extending four scales posterior to parietals.

The Museum has no others from Mexico; in fact, this is the only specimen known as yet from Mexico.

***TANTILLA NIGRICEPS FUMICEPS (Cope)**

Two Mexican specimens in the Museum are from Mier, Tamaulipas (Nos. 46584-5).⁸⁷

⁸⁶ Cope, 1863, p. 100.

⁸⁷ Smith, 1938, p. 150.

TANTILLA PHRENITICA Smith

Tantilla phrenitica SMITH, Zoologica, vol. 27, p. 39, 1942.

Seven specimens are in the collection, all from Cuautlapan, Veracruz (Nos. 110379-85).

The upper and lower labials are 7-7 in all except one, which has 6-7 lower labials; preoculars 1-1, postoculars 2-2 in all. Collar involves tips of parietals in four, borders them in three; the first infralabials are separated medially in all.

The Museum has one other Mexican specimen, from Totontepec, Oaxaca (No. 20835), and a specimen from Guatemala (No. 38134).

TABLE 35.—*Variation in Tantilla phrenitica*

U.S.N.M. No.	Sex	Ventrals	Caudals	U.S.N.M. No.	Sex	Ventrals	Caudals
110379	♀	139	37	110382	♂	139	43
110381	♀	137	40	110383	♂	140	43
20835	♀	147	36	110380	♂	141	42
38134	♀	136	37	110384	♂	140	37
110385	♀	138	36				

TANTILLA RUBRA Cope

Eight specimens, one from 22 km. north of Tehuacán, Puebla (No. 110387), the others from the vicinity of Tehuantepec, Oaxaca (Nos. 110388-94). The Tehuacán specimen was found inside a large mound of *Mammillaria* cactus, but already dead, stiffened, and slightly discolored. It seemed to have no injury. The Tehuantepec specimens were found under piles of earth, brush, and leaves in banana patches. The largest specimen (No. 110388) measures 353 mm. in total length (tip of tail missing).

The upper and lower labials are 7-7 in all, the preoculars 1-1, postoculars 2-2. The first infralabials are in contact medially, and the nuchal collar involves the tips of the parietals in all.

TABLE 36.—*Variation in Tantilla rubra*

U.S.N.M. No.	Sex	Ventrals	Caudals	U.S.N.M. No.	Sex	Ventrals	Caudals
110389	♀	158	63	110388	♀	153	-----
110391	♀	160	66	110390	♀	148	-----
110392	♀	155	-----	110393	♀	158	64
110387	♀	159	68	110394	♀	151	64

The Museum has two others, from the vicinity of Tehuantepec (Tapana and Barrios, Nos. 26500, 30530).

TANTILLA STRIATA Dunn

Four specimens were secured; one is a topotype, from Mixtequilla, Oaxaca (No. 110375); another is from La Concepción, about 40 km. west of Tehuantepec (HMS No. 18518); a third is from Cajón de Piedra, west of Salina Cruz, Oaxaca (No. 110376); the last is from Las Pilas, 20 km. southwest of Tehuantepec, Oaxaca (No. 110585).

The upper and lower labials are 7-7, the preoculars 1-1, postoculars 2-2 in all; the mental is in contact with the anterior chinshields.

The Museum has no others of the species.

Ventrals and caudals, respectively, in No. 110375 (♀), 160, 34; No. 110376 (♂), 157, 42; No. 18518 (♂), 163, 37.

TANTILLA WILCOXI RUBRICATA Smith

Tantilla wilcoxi rubricata SMITH, Zoologica, vol. 27, pp. 40-41, 1942.

The two types (Nos. 110398-9) were found under stones in a semi-arid region, during a period of drizzling showers, 15 miles southeast of Galeana, Nuevo León.

The Museum has no others of this race.

Of considerable interest are five specimens (77241[3]-77242[2]) in the Museum of Zoology, University of Michigan, from Charcas, San Luis Potosí. All have 7-7 supralabials and the mental separated from the chin shields, but in other characters of scutellation there is considerable variation. The preocular is fused with the prefrontal on one side in one (1-1 in others); the postoculars are 2-2 except in one which has the lower scale fused with the 4 supralabials; the prefrontal is in contact with the labials in three; there are 4-4 infralabials in one (several scales fused) 6-7 in one, and 7-7 in three; and the secondary temporal is elongate on one side in one, on both sides in two, but divided on both sides of two and on one side of one. The scale rows are reduced to 13 posteriorly in one specimen. Variation in ventral and caudal count is given in table 37.

TABLE 37.—*Variation in Tantilla wilcoxi rubricata*

Sex	Ventrals	Caudals	Total length	Tail length	Sex	Ventrals	Caudals	Total length	Tail length
♂	152	-----	239+	42+	?	155	-----	-----	-----
♂	145	59+	250	59	♀	147	54	199	43.5
♀	152	55	219	51					

In head pattern these specimens agree exactly with the types of *rubricata*. The dark head cap (which is dark gray, not jet black) fades below the level of the orbit on the sides of the head, reaching the tip only in the posterior temporal region. The light nuchal collar is distinct, with a narrow, dark posterior border, and involves the tips of the parietals.

In head pattern it is impossible to allocate these specimens with anything but *w. rubricata*. From this, however, they differ in having the mental separated from the chinshields (separated on one side in the type), and in having more numerous ventrals (140, 144, 146 in other *w. rubricata*, as against 145 to 155 in the present series). In spite of these differences I believe it best to associate these specimens with *w. rubricata*; the total range in ventral counts is not unduly large, and the mental character is admittedly variable. They have nothing to do with *bocourti*, which has divided secondary temporals, as that species has 164 or more (to 185) ventrals. *T. deriatriæ* has a broader collar and different head pattern, as well as perhaps a higher average number of ventrals (154 to 160). *T. atriceps* has a narrower collar and fewer ventrals (139 or less, with no close approach to *w. rubricata* when sexes are separated). Apparently the only other form approached by these specimens is *w. wilcoxi*; their higher counts nearly or quite reach those of the latter race. Three males of *w. wilcoxi* have 152 to 155 ventrals, and one has 62 caudals (145 to 152 ventrals, 54 to 59 caudals, in four *w. rubricata*); three females of *w. wilcoxi* have 159 to 164 ventrals, and two have 64 and 67 caudals (146 to 155 ventrals, 51 to 55 caudals, in four *w. rubricata*).

TANTILLITA LINTONI (Smith)

Tantilla lintoni SMITH, Proc. Biol. Soc. Washington, vol. 53, pp. 61-62, fig. 1, 1940.
Tantillita lintoni SMITH, Journ. Washington Acad. Sci., vol. 31, pp. 115-117, 1941.

The type (No. 108603) was found at night wriggling over the surface of leaves near a trail near Piedras Negras, Guatemala.

The Museum has no others of the species.

*THAMNOPHIS ANGUSTIROSTRIS (Kennicott)

A single specimen, the only known, is in the Museum, from Alamo de Parras, Coahuila (No. 959, type).⁸⁸

THAMNOPHIS CHRYSOCEPHALUS (Cope)

Three specimens were secured, one above Acultzingo, Veracruz (No. 110774), the other two at Pájaro Verde, Puebla (Nos. 110775-6).

The Museum has 12 other specimens, from the states of Veracruz (Orizaba, Nos. 7077 [6], 30494 [type]⁸⁹), Oaxaca (Mountain Zempoal-

⁸⁸ Kennicott, 1860, p. 332; Smith, 1942f, pp. 120-121.

⁸⁹ Cope, 1885a, pp. 173-174.

tepec, No. 46446; Totontepec, Nos. 46445, 46610), and Guerrero (Omiteme, Nos. 46342, 47747). Other specimens recorded in table 38 are from Acultzingo, Veracruz (EHT-HMS Nos. 21536-8); Nuchil, Veracruz (F. M. N. H. No. 1519); Omiteme, Guerrero (EHT-HMS Nos. 23778, 23780, 23782); and Cerro San Felipe, Oaxaca (EHT-HMS No. 5556).

TABLE 38.—*Variation in Thamnophis chrysocephalus*

Museum No.	Sex	Scale rows	Ventrals	Caudals	Supra-labials	Infra-labials	Pre-oculars	Post-oculars
U.S.N.M. No. 7077-----	♀	17-17-15	147	----	8-8	9-9	1-1	3-3
U.S.N.M. No. 7077d-----	♀	17-17-15	145	75	8-8	9-10	1-1	3-3
U.S.N.M. No. 46445-----	♀	17-17-15	147	71	8-8	9-9	1-1	2-3
U.S.N.M. No. 46446-----	♀	17-17-15	154	----	8-8	10-10	1-1	2-3
U.S.N.M. No. 110774-----	♀	17-17-15	148	70	8-8	9-10	1-1	3-3
U.S.N.M. No. 110775-----	♀	17-17-15	145	72	8-8	10-11	1-1	3-3
EHT-HMS No. 23778-----	♀	17-17-15	148	65	8-8	10-10	1-1	3-3
EHT-HMS No. 23782-----	♀	17-17-15	151	71	8-8	10-10	1-1	3-3
EHT-HMS No. 21536-----	♂	17-17-15	149	77	8-8	10-12	1-1	3-3
EHT-HMS No. 21537-----	♂	17-17-15	152	80	7-8	10-10	1-1	3-3
EHT-HMS No. 21538-----	♂	17-17-15	148	79	8-8	10-10	1-1	3-3
EHT-HMS No. 23780-----	♂	17-17-15	146	80	8-8	10-10	1-1	3-3
EHT-HMS No. 5556-----	♂	17-17-15	146	76	8-8	10-10	1-1	3-3
F.M.N.H. No. 1519-----	♂	17-17-15	148	77	8-9	10-10	1-1	3-3
U.S.N.M. No. 7077a-----	♂	17-17-15	149	----	8-8	10-10	1-1	3-3
U.S.N.M. No. 7077b-----	♂	17-17-15	154	----	8-8	10-10	1-1	3-3
U.S.N.M. No. 7077c-----	♂	17-17-15	149	78	8-8	8-9	1-1	3-3
U.S.N.M. No. 7077e-----	♂	17-17-15	151	81	8-8	10-10	1-1	3-3
U.S.N.M. No. 30494-----	♂	17-17-15	153	80	8-8	9-10	1-1	3-3
U.S.N.M. No. 46342-----	♂	17-17-15	148	77	8-8	10-10	1-1	3-3
U.S.N.M. No. 46610-----	♂	17-17-15	148	77	8-8	10-10	1-1	2-3
U.S.N.M. No. 47747-----	♂	17-17-15	142	83	8-8	10-10	1-1	4-4
U.S.N.M. No. 110776-----	♂	17-17-15	146	82	8-8	10-10	1-1	3-4

THAMNOPHIS EQUUS EQUUS (Reuss)

Thamnophis equus equus SMITH, Zoologica, vol. 27, pp. 106-107, 1942.

A series of seven specimens is from Tacicuaró, Michoacán (Nos. 110777-83).

The Museum has 19 other specimens, as follows: DURANGO: Huasamota (No. 46482); Durango (No. 8066). GUANAJUATO: Nos. 9892, 9899 (type of *pulchrilatus*),⁹⁰ 14433-4, 25363, 26147-8. MEXICO: Nochitongo Ditch, 30 miles north of Mexico City (No. 19003). MICHOACÁN: Los Reyes (No. 46463). OAXACA: Huajuapam (No. 46605). SINALOA: Rosario (No. 46457). VERACRUZ: Las Vigas (No. 46432); Mirador

⁹⁰ Cope, 1885a, p. 174.

(No. 25038); Orizaba (No. 30496). ZACATECAS: San Juan Capistrano (No. 46423). Two (Nos. 32279-80) without locality.

THAMNOPHIS EQUES CYRTOPSIS (Kennicott)

Thamnophis eques cyrtopsis SMITH, Zoologica, vol. 27, p. 108, 1942.

One specimen (No. 105303) is from 21 miles north of Saltillo, Coahuila.

The Museum has 14 others from Mexico: CHIHUAHUA: Arroyo del Alamos, Casas Grandes (No. 42876); Cajón Bonito Creek (No. 21056); Chihuahua (No. 14256); Guadalupe y Calvo (Nos. 46356-8); San Luis Mountains (Nos. 21057-8). COAHUILA: Rinconada (No. 8067, type of *cyrtopsis*). DURANGO: Guanacevi (No. 46367). NAYARIT: Santa Teresa (Nos. 46420-1). SAN LUIS POTOSÍ: Hacienda La Parada (No. 46410). SONORA: Guadalupe Cañon (No. 21059).

THAMNOPHIS MACROSTEMMA MACROSTEMMA (Kennicott)

Nine specimens were secured: Chimalhuacán, Mexico (Nos. 110784-7); 7 miles west of Villa Victoria, Mexico (No. 110788); Pátzcuaro, Michoacán (Nos. 110789-91); and Tecamachalco, Puebla (No. 110792).

TABLE 39.—*Variation in Thamnophis macrostemma macrostemma*

U.S.N.M. No.	Sex	Scale rows	Ventrals	Caudals	Supra- labials	Infra- labials	Preoculars	Postoculars
110784	♂	19-21-17	161	76	8-8	-----	-----	-----
110788	♂	20-21-17	163	77	8-8	9-10	1-1	3-4
110790	♂	21-21-17	165	-----	8-8	10-12	1-1	3-3
110791	♂	21-21-17	164	75	8-8	10-11	1-1	3-3
110792	♂	19-21-17	164	68	8-8	10-11	1-1	3-3
110785	♀	19-21-17	157	71	8-8	10-10	1-1	3-3
110786	♀	19-21-17	155	65	8-8	10-10	1-1	3-4
110787	♀	21-21-17	160	66	8-8	10-10	1-1	3-3
110789	♀	21-21-18	154	67	8-8	10-11	1-1	3-3

The Museum has 47 others, as follows: DISTRITO FEDERAL: Mexico City (No. 7247); La Viga Canal (Nos. 18997-19002); Chapultepec (Nos. 32163-4). GUANAJUATO (Nos. 15427-8, 17434-6). JALISCO: Atemajac (Nos. 46383-4); Magdalena (No. 67371); Ocotlán No. 46544). MEXICO: Lerma (Nos. 46599-600); Toluca (No. 32282). MICHOACÁN: Tupátaro (No. 11366 [2]). OAXACA: Mitla (No. 46500). PUEBLA: Atlixco (No. 46431). SAN LUIS POTOSÍ: La Parada (Nos. 46407-9). VERACRUZ: Mirador (No. 25039). INDEFINITE LOCALITY: Nos. 12725, 12727, 14597, 14606, 24991-5, 25254-7, 26143-6, 46359.

THAMNOPHIS MACROSTEMMA MEGALOPS (Kennicott)

Seventeen specimens were collected near Progreso, Chihuahua (Nos. 104633, 104642-57).

TABLE 40.—*Variation in Thamnophis macrostemma megalops*

U.S.N.M. No.	Sex	Scale rows	Ventrals	Caudals	Supra- labials	Infralabials	Preoculars	Postoculars
104633	♀	21-21-17	154	-----	8-8	10-10	1-1	3-3
104642	♀	21-21-17	157	-----	8-8	10-11	1-1	3-3
104646	♀	21-21-17	160	-----	8-8	11-11	1-1	3-3
104648	♀	21-21-17	160	-----	8-8	11-11	1-1	3-3
104649	♀	21-21-17	159	-----	8-9	11-11	1-1	3-4
104650	♀	21-21-17	154	72	8-8	10-11	1-1	3-4
104653	♀	21-21-17	161	73	8-8	10-11	1-1	3-3
104654	♀	21-21-17	157	69	8-9	10-11	1-1	3-3
104643	♂	21-21-17	161	-----	8-8	10-11	1-1	3-3
104644	♂	21-21-17	167	-----	8-8	10-10	1-1	3-3
104645	♂	21-21-17	166	82	8-8	10-10	1-1	3-3
104647	♂	21-21-17	162	82	8-8	10-10	1-1	3-3
104651	♂	21-21-17	166	-----	8-8	10-10	1-1	3-3
104652	♂	21-21-17	164	81	8-8	10-11	1-1	3-3
104655	♂	21-21-17	162	81	8-8	10-?	1-1	3-3
104656	♂	21-21-17	171	-----	8-8	10-10	1-1	3-3
104657	♂	21-21-17	163	79+	8-?	?-?	1-?	3-?

The Museum has 18 others from Mexico, as follows. SONORA: Santa Magdalena (No. 965; Tucson, Ariz.?). DURANGO: Ada Magdalena (No. 46366). CHIHUAHUA: Casas Grandes (No. 46377); Colonia García (No. 46335); Santa Rosalia (No. 46342); Sierra Madre (No. 46506); Chihuahua City (Nos. 14226 [2], 46448); "Chihuahua" (Nos. 7248, 14258, 14277 [2], 14289 [2], 14292, 45596). NAYARIT: ?Santa Teresa (No. 46429).

THAMNOPHIS MARCIANUS (Baird and Girard)

Thamnophis marcianus SMITH, Zoologica, vol. 27, p. 114, 1942.

Eight specimens (Nos. 104631-41) were collected near Progreso, Chihuahua.

The Museum has 26 others from Mexico, as follows: CHIHUAHUA: 15 leagues north of Guerrero (No. 46583); Ojos del Diablo (No. 30837). "SONORA": No. 7235. TAMAULIPAS: Charco Escondido (No. 849); Matamoros (Nos. 15344, 861 [19], 5491); 38 miles south of Reynosa (No. 95183).

THAMNOPHIS MELANOGASTER MELANOGASTER (Peters)

Thamnophis melanogaster melanogaster SMITH, Zoologica, vol. 27, pp. 116-117, 1942.

Six specimens were secured, at Chimalhuacán, Mexico (Nos. 110793-8), where the species is common in irrigation ditches.

The Museum has two other specimens (Nos. 12726, 12729), from Mexico, D. F.

THAMNOPHIS MELANOGASTER CANESCENS Smith

Thamnophis melanogaster canescens SMITH, Zoologica, vol. 27, pp. 117-120, 1942.

Two specimens were secured, one (No. 110799) at La Palma, Michoacán, the other at Tacécuaro, Michoacán (No. 110800). Both are paratypes.

The Museum has 14 other specimens referred to this race: Nos. 11365 (2), 14604, 26149-50, probably from Guanajuato (Dugès, coll.); Nos. 23985-9, from Durango, Durango; and Nos. 46411-4, Hacienda La Parada, San Luis Potosí.

***THAMNOPHIS ORDINOIDES ERRANS Smith**

A single specimen, the type, in the Museum is from Colonia García, Chihuahua (No. 46336).⁹¹

***THAMNOPHIS PHENAX PHENAX (Cope)**

Five specimens⁹² are in the Museum, from "Alpine region, Orizaba, Veracruz" (No. 7079 [3]), and Córdoba, Veracruz (Nos. 30498-9, latter type⁹³). It seems probable that the locality data for one or the other of these series are incorrect.

THAMNOPHIS PHENAX HALOPHILUS Taylor

Thamnophis phenax halophilus SMITH, Zoologica, vol. 27, p. 100, 1942.

A single specimen (No. 110801) was collected at Tequeyutepec, Veracruz.

The Museum has no others of this subspecies.

A specimen in the Museum of Comparative Zoology (No. 27114) recently examined closely agrees with the above specimen. It bears the locality data "Alpine region, Orizaba" and was collected by François Sumichrast. It is a male with 19-19-17 scale rows, 154 ventrals, 71 (+ ?) subcaudals, 8-8 supralabials, 11-11 infralabials, 1-1 preoculars, 3-3 postoculars, and 1-2-3 temporals; it measures 579 mm. in total length, and 131 mm. in tail length. The light parietal

⁹¹ Smith, 1942f, pp. 112-114.

⁹² Cope, 1868a, p. 134; Ruthven, 1908, p. 131.

⁹³ Smith, 1942f, pp. 99-100.

spots are present, surrounded by a very narrow border of black; in this respect only it differs in pattern from the above. In the other specimens of this race the black areas on the parietals are more extensive. The lack or dimness of the stripes and the presence of the light, dark-edged parietal spots are the chief characters distinguishing this from *eques*, which occurs in the same vicinity although perhaps not in exactly the same localities. There are 26 maxillary teeth in the above specimen.

It is probable that *phenax* is, as most other authors have supposed but I had refused to believe, a lowland form; a specimen recently acquired by the University of Michigan Museum of Zoology, from Potrero Viejo, Veracruz (No. 89363), is from about the same elevation as Córdoba, the type locality. Since the latter is the only specimen known aside from series collected many years ago by Sumichrast, much remains to be discovered of the normal range of the race. Tentatively it must be concluded that *phenax phenax* is a lowland race intergrading at higher elevations with *phenax halophilus*; thus the locality data on U.S.N.M. No. 7079 (instead of that of the type), said to be from "Orizaba, Alpine Region," must remain in doubt. Both forms are so rare that the possibility that they are near extinction is suggested.

The Potrero Viejo specimen of *p. phenax* is a female with 19-19-17 scale rows, 152 ventrals, 63 caudals, 8-8 supralabials, 10-11 infralabials, 1-1 preoculars, 4-4 postoculars, a total length of 323 mm., tail 70 mm. All markings are very dim, since the snake unfortunately was killed shortly before shedding; however, about 38 dark cross bands can be discovered on the body separated from each other by narrow, transverse light bands covering the length of about one scale row; the posterior edges of the third, fifth, and seventh supralabials are dark; an irregular dark-edged, elongate light spot on the suture between the parietals can be discerned; the belly is grayish, darker posteriorly and on tail.

Another specimen of *phenax phenax* (M.C.Z. No. 45688) is said to be from Tequeyutepec, Veracruz; this, as the University of Michigan specimen, was collected by Dyfrig McH. Forbes. It is a male with 19-19-17 scale rows, 154 ventrals, 73 caudals, 7-8 supralabials, 10-10 infralabials, 1-1 preoculars, 3-3 postoculars, a total length of 298 mm., tail 71 mm. Although this, like the preceding, was about to shed when caught, the pattern is fairly distinct; there are 45 broad blotches on the body; the posterior edges of all supralabials except the last are black, and the last has a dark anterior edge; an elongate light streak, with undulating lateral margins, occupies the median parietal suture, and is bounded on either side by a large dark spot that occupies most of the parietal; there are large irregular dark marks on other dorsal

head scales. Whether this specimen actually was collected near Tequyutepec is not certain. It does not seem probable that the form occurs both at Potrero and at Tequyutepec, although this is not impossible; also it does not seem probable that *p. phenax* would occur with *p. halophilus* at Tequyutepec, although this also is not impossible; if the latter is true, then some doubt is thrown upon the association of the two forms as subspecies. Data available at present are much too inadequate for the formation of definite conclusions.

THAMNOPHIS RUFIPUNCTATUS (Cope)

Thamnophis rufipunctatus SMITH, Zoologica, vol. 27, pp. 120-121, 1942.

Four specimens were secured near Progreso, Chihuahua (Nos. 104658-61).

The Museum has 15 other specimens, from Mexico, as follows: Guanacavi, Durango (No. 46369); Meadow Valley, Chihuahua (No. 26592); Río Casas Grandes (No. 26 91); Arroyo del Alamos, 70-74 km. south of Nueva Casas Grandes, Chihuahua (Nos. 42874-5); Chihuahua (Nos. 14254, 14261 (2), 14265, 14271, 14275, 14286, 14288); Río Papagochic, Guerrero, Chihuahua (No. 95697); Guadalupe y Calvo (No. 46368).

THAMNOPHIS RUTHVENI Hartweg and Oliver

Thamnophis ruthveni SMITH, Zoologica, vol. 27, p. 114, 1942.

A single topotype, from near Tehuantepec, Oaxaca (No. 110802), was collected.

The Museum has one other, from Chivela, Oaxaca (No. 46364).

THAMNOPHIS SAURITUS CHALCEUS (Cope)

One specimen (No. 110805) was secured at Jonuta, Tabasco. It is a male with 150 ventrals and 92 caudals.

The Museum has three others from Mexico, from Montecristo, Tabasco (No. 46548); Puerto Morelos, Yucatán (No. 46530), and Cozumel Island (No. 13906, type of *rutiloris*).⁹¹

THAMNOPHIS SAURITUS PROXIMUS (Say)

Thamnophis sauritus proximus SMITH, Zoologica, vol. 27, p. 116, 1942.

Three specimens were secured, one (No. 105305) at Hacienda La Clementina, near Forlón, Tamaulipas, and two (Nos. 110803-4) near Acultzingo, Veracruz. The ventrals of these, in the above order, are 160, 159, 160; caudals 102+ (♂), 97 (♂), 98 (♀).

⁹¹ Cope, 1885b, pp. 388-389.

The Museum has eighteen others from Mexico: NUEVO LEÓN: Caderita (No. 749). TAMAULIPAS: Matamoros (Nos. 5484, 15343); Hidalgo (No. 46435). VERACRUZ: Gutierrez Zamora (No. 46525); Jalapa (No. 5487 [2]); Orizaba (Nos. 755 [2], 7080 [2], 30355-6, 46449); Tuxpan (Nos. 25190-1). OAXACA: "Tehuantepec" (Nos. 30161-2) (in error?).

THAMNOPHIS SCALARIS SCALARIS Cope

Thamnophis scalaris scalaris SMITH, Zoologica, vol. 27, pp. 100-101, 1942.

A single specimen is from Cruz Blanca, Veracruz (No. 110806), found under a fallen pine log.

The Museum has seven other specimens, all from "Orizaba," Veracruz (Nos. 7076 [4], 12115-6, 30497).

THAMNOPHIS SCALARIS GODMANI (Günther)

Thamnophis scalaris godmani SMITH, Zoologica, vol. 27, pp. 101-103, 1942.

Four specimens are from above Acultzingo, Veracruz (Nos. 110807-9), San Diego, Puebla (No. 110810), and Pájaro Verde, Puebla (No. 110811).

The Museum has two others, from Oaxaca, Oaxaca (Nos. 46534, 46604).

THAMNOPHIS SCALARIS SCALIGER (Jan)

Thamnophis scalaris scaliger SMITH, Zoologica, vol. 27, pp. 103-104, 1942.

Seven specimens are from Popocatepetl (No. 110815), Zempoala (No. 110816), and 15 km. west of Toluca (Nos. 110812-4), Mexico; and 2 miles east of Río Frío, in Puebla (Nos. 110817-8).

The Museum has four others, from Nahuatzén, Michoacán (No. 46553); Mexico City, D. F. (No. 12730); Toluca, México (No. 32281); and Guanajuato (No. 12675).

***THAMNOPHIS SIRTALIS PARIETALIS** (Say)

A single Mexican specimen is in the Museum from Casas Grandes, Chihuahua (No. 46371).⁹⁵

THAMNOPHIS SUMICHRASTI SUMICHRASTI (Cope)

Thamnophis rozellae SMITH, Proc. Biol. Soc. Washington, vol. 53, pp. 56-57, 1940.

Thamnophis sumichrasti suntichrasti SMITH, Zoologica, vol. 27, pp. 110-111, 1942.

Three specimens were secured, the type of *rozellae* (No. 103597) from Palenque, Chiapas, and two paratypes (Nos. 108598-9) from Aguacate, Chiapas.

In addition the Museum has the type and paratype of *sumichrasti*

⁹⁵ Smith, 1942f, p. 114.

(Nos. 26501-2)⁹⁶ from "Orizaba," Veracruz; a specimen from Montecristo, Tabasco (No. 46549); and another from "Guatemala" (No. 25234).

**THAMNOPHIS SUMICHRASTI PRAEOCULARIS* (Bocourt)

Two specimens are in the Museum, from Puerto Morelos, Yucatán (Nos. 46528-9).⁹⁷

**TOLUCA CONICA* Taylor and Smith

Six specimens⁹⁸ are in the Museum, from Guajamaloya, Oaxaca (No. 46535, paratype), and "Mexico" (Nos. 30553, 31361, 31363-5).

TOLUCA LINEATA LINEATA Kennicott

Toluca lineata lineata TAYLOR and SMITH, Univ. Kansas Sci. Bull., vol. 28, pp. 343-346, 1942.

Nine specimens were collected, at the following localities: VERACRUZ: Cruz Blanca (No. 110747); El Limón Totalco (Nos. 110744-6). MÉXICO: 15 km. west of Toluca (Nos. 110751-4); 10 miles west of Villa Victoria (No. 110755).

TABLE 41.—*Variation in Toluca lineata lineata*

U.S.N.M. No.	Sex	Ventrals	Caudals	Supralabials	Infralabials	Postoculars	Loricals
110744	♀	128	30	7-7	7-7	2-2	0-0
110745	♀	127	30	7-7	7-7	2-2	1-1
110746	♂	116	41	7-7	6-7	2-2	0-0
110747	♂	119	37	7-7	6-7	2-2	1-1
110751	♀	124	27	7-7	7-7	1-1	0-0
110752	♀	124	26	7-7	7-7	1-2	1-1
110753	♀	126	28	7-7	7-7	1-1	0-0
110754	♂	119	34	7-7	7-7	2-2	0-1
110755	♂	117	37	7-7	7-7	1-2	0-0

The internasals and prefrontals are present in all; scale rows 17-17; preoculars 1-1; temporals 1-1 on one side of one, but otherwise 1-2; posterior chin shields separated in all; there are no entire caudal scales in any specimen.

The Museum has eight other specimens, from Tulancingo, Hidalgo (No. 36271); Valley of Mexico (Nos. 2103-4, 32379); Guanajuato (No. 9913); ?Puebla (No. 30553); mountains near San Luis Potosí, S. L. P. (No. 46427); and Nahuatzén, Michoacán (No. 46426).

⁹⁶ Cope, 1867a, p. 306.

⁹⁷ Smith, 1942f, p. 111.

⁹⁸ Taylor and Smith, 1942b, pp. 340-343.

TOLUCA LINEATA ACUTA (Cope)

Toluca lineata acuta TAYLOR and SMITH, Univ. Kansas Sci. Bull., vol. 28, pp. 346-348, 1942.

Two typical specimens (Nos. 110761-2) are from Cacaloapan, Puebla. The first is a male, the second a female. Respectively the ventrals are 119, 128; caudals 38, 32; supralabials and infralabials 7-7; preoculars 1-1; postoculars 2 2; temporals 1-2, 1-2 (2-2); total length 228 mm., 123 mm.; tail length 45 mm., 19 mm.

The Museum has one other specimen, the type (No. 30552), said to be from Juchitán, Oaxaca, but almost certainly not.

TOLUCA LINEATA VARIANS (Jan)

Toluca lineata varians TAYLOR and SMITH, Univ. Kansas Sci. Bull., vol. 28, pp. 348-350, 1942.

Sixty-three specimens were secured, above Acultzingo, Veracruz (Nos. 110671-725), near Puente Colorada, Veracruz (Nos. 110748-50), and at Pájaro Verde, Puebla (Nos. 110760, 110756-9). One of these, when discovered by turning a stone, flattened the fore part of the body somewhat as an *Heterodon* or *Ninia*. No other specimen of the genus has been observed to do so by me. All were found under stones.

The Museum has two others, No. 30551 from "Mexico" (Sumichrast), and No. 110957 from Orizaba, Veracruz.

The veracity of the locality data on these specimens cannot be doubted, since practically all were collected by my wife and me. Although three localities are cited, all are within a radius of half a mile and in the same sort of terrain. Five of this series have 15 scale rows posteriorly (2♂, 3♀), and one (♀) has 16; all others have 17 scale rows throughout the body. In 29 females the ventrals vary from 128 to 138, average 133.1 (128, 3; 129, 3; 130, 1; 131, 1; 132, 3; 133, 4; 134, 7; 135, 3; 136, 1; 138, 3); in 33 males they vary from 119 to 127, average 123.4 (119, 2; 120, 3; 122, 2; 123, 8; 124, 8; 125, 6; 126, 3; 127, 1). The caudals vary in 27 females from 29 to 36, average 32.9 (29, 1; 30, 2; 31, 3; 32, 4; 33, 7; 34, 5; 35, 4; 36, 1); in 31 males they vary from 36 to 44, average 40.5 (36, 1; 37, 2; 38, 2; 39, 4; 40, 6; 41, 5; 42, 5; 43, 5; 44, 1). There is one entire subcaudal scale in one specimen; in all others all the caudals are entire. The posterior chin shields are separated in 35 (16♀, 19♂), in contact in 28 (13♀, 15♂). The minimum rows of scales from the chin shields to the first full width (first counted) ventral vary from 2 to 6. The total ventral counts, including these small scales, from chin shields to anal plate, vary from 131 to 142 in females, 122 to 131 in males; in both sexes the range of variation is increased by 1, but also both variation curves are somewhat smoothed (females, 131, 1; 132, 2; 133, 2; 134, 3; 135, 2;

136, 3; 137, 4; 138, 4; 139, 4; 140, 1; 142, 3; in males, 122, 1; 123, 1; 124, 2; 125, 1; 126, 4; 127, 8; 128, 7; 129, 4; 130, 3; 131, 2); this possibly indicates that, with larger series, the more accurate measurement of ventral scale number is secured by counting all ventral scales from chin shields to anal, as both the obvious variation in the position of

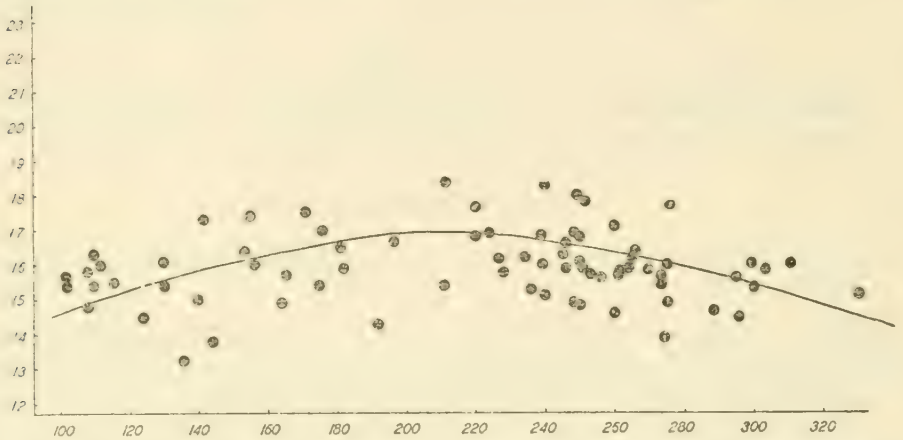


Fig. 14.—Variation in tail-total length proportion (abscissa) plotted against total length (coordinate) in females of *Toluca l. varians*.

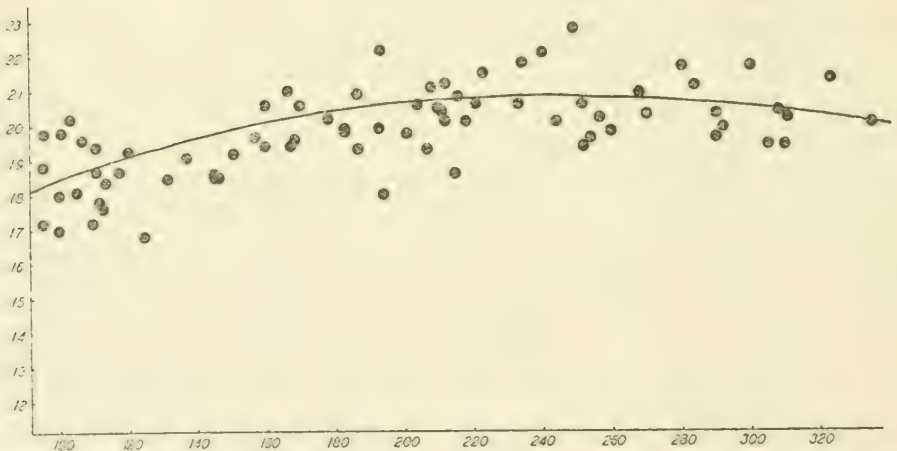


Fig. 15.—Variation in tail-total length proportion (abscissa) plotted against total length (coordinate) in males of *Toluca l. varians*.

the first ventral, as well as the human variable introduced by the necessity of arbitrarily deciding which ventral should be counted as first, are eliminated: larger series will be necessary, however, to demonstrate whether this indication is true.

Without exception the supralabials are 7-7. The infralabials are normally 7-7, but in six specimens (three of each sex), there are 6-7

(the loss caused by fusion of the sixth and seventh labials in two, by second and third in two, and by fourth and fifth in one; in one the sixth labial is eliminated from the labial border by contact of 5 and 6); in 13 (8 ♂, 5 ♀) there are 7-8, and in three (2 ♂, 1 ♀) there are 8-8. In all the preoculars are 1-1, the postoculars 2-2; in all but three the temporals are 1-2, and in the exceptions they are 1-1. Without exception the loreal is present on both sides. All have 2 internasals and 2 prefrontals: in one a large, azygous scale between the prefrontals is partially formed. In no specimen do the prefrontals contact the labials. The second supralabial contacts the preocular on one side in 9 (5 ♀, 4 ♂), on both sides in 13 (1 ♀, 12 ♂).

The percent of the total length comprised by the tail length varies from 12.8 to 17.5 in females, and from 16.8 to 21.7 in males. The percentages tend to increase more sharply and over a longer period in males than in females, as shown in figures 14, 15. The maximum percentages in males are reached at about 250 to 275 mm. total length, while in females they are reached at about 210 to 245 mm. snout to vent.

One specimen (No. 110746) has a number of well-developed young, nearly ready for birth, in the uteri.

TOLUCA LINEATA WETMOREI, new subspecies

Holotype.—U.S.N.M. No. 110727, male, collected at Pan de Olla, Veracruz.

Paratypes.—Sixty-eight, including U.S.N.M. Nos. 110726, 110728-43, and Univ. Mich. Mus. Zool. No. 89370 (13), all topotypes, collected March 22, 1940, by Dyfrig McH. Forbes, Luis, Gilberto, and Gavino Gureía, and H. M. Smith; U.S.N.M. Nos. 46405, 46442, EHT-H.M.S. No. 16241. Las Vigas, Veracruz; Mus. Comp. Zool. No. 45685, Tequeyutepec, Veracruz; and E.H.T.-H.M.S. Nos. 23693-5, 27917-28, 27939-57, near Tezuítlán, Puebla.

Diagnosis.—Like *Toluca l. lineata*, except infralabials generally (94 percent) 6-7 or less; differing from *l. varians* and *l. acuta* in this character and in pattern and number of ventrals and caudals.

Description of holotype.—Rostral protruding, pointed, not turned upward, its length visible from above about equal to its distance from frontal; two internasals, almost as long as prefrontals, not extending so far laterally as latter; frontal hexagonal, with an obtuse angle anteriorly, an acute one posteriorly, sides slightly convergent; length of frontals (3.2 mm.) very slightly less than that of parietals, considerably greater than its distance from tip of snout (2.5 mm.); nasal entire, in contact with preoculars, narrowed posteriorly; pre-

ocular single, large, in contact with second and third supralabials; one postocular; 1-2 temporals (the anterior abnormally fused with penultimate labial on one side); 7-7 supralabials, penultimate largest; 6-6 infralabials, the last elongate and not quite reaching even with posterior margin of last supralabial; two rather large anterior chin shields, in contact with three anterior infralabials; posterior chin shields separated from each other medially, scarcely larger than small gular scales; four small scales from posterior chin shields to the first full-width ventral.

Dorsal scale rows 17-17, with single apical pits, all smooth; ventrals 119; anal divided; subcaudals 38; two subcaudals entire.

Dorsal surface slate-gray; a middorsal series of small, black spots extending from nape onto tail; these spots involving the edges of the paravertebral scale rows, separated from one another by spaces of less than one scale length. Most dorsal scales with dark bases, and scattered, irregular dark streaks over the rest of the surface. Belly whitish, with a very few, small, dark spots on the posterior edges of the ventrals, near their ends; tail whitish, slightly stippled.

Variations.—Most specimens are colored like the type, but a few are reddish instead of gray in ground color. The pattern closely resembles that of *L. lineata*.

The variation of the entire series of 69 specimens examined is as follows: One has 16 scale rows near the anus, all others 17 throughout the body. In 30 females the ventrals vary from 120 to 130, average 126.2 (120, 1; 123, 1; 124, 4; 125, 5; 126, 5; 127, 7; 128, 2; 129, 3; 130, 2); in 39 males they vary from 117 to 126, average 120.9 (117, 3; 118, 4; 119, 5; 120, 9; 121, 5; 122, 3; 123, 2; 124, 3; 125, 3; 126, 2). The caudals vary in 30 females from 25 to 33, average 29.2 (25, 2; 27, 4; 28, 4; 29, 8; 30, 4; 31, 3; 32, 4; 33, 1); in 38 males they vary from 34 to 43, average 38.5 (34, 1; 36, 5; 37, 4; 38, 8; 39, 10; 40, 6; 41, 2; 42, 1; 43, 1). Eighteen specimens have 1 to 21 entire subcaudals; of the 30 females only four specimens have entire subcaudals (1, 1, 3, 6), while of the 39 males, 14 have entire subcaudals (1, three; 2, three; 3, four; 4, one; 5, one; 16, one; 21, one); the latter two are of moderate size, of 219 mm. and 162 mm. total length, respectively; the others are of varying length, from 287 to 106 mm.; with the character there is no obvious linkage with lethal characters. The posterior chin shields are separated in 45 (23 ♂, 22 ♀) in contact medially in 24 (16 ♂, 8 ♀). The number of small gular scales from the posterior chin shields to the first full-sized ventral varies from 3 to 6. The total ventral counts, including three small scales, from chin shields to anal plate, vary from 126 to 136 in females, 122 to 131 in males; the range of variation with this count is not increased over that obtained by excluding the smaller anterior

scales; in females the curve of variation is somewhat more regular (126, 1; 128, 1; 129, 4; 130, 5; 131, 7; 132, 5; 133, 3; 134, 2; 135, 1; 136, 1), but in males it is considerably spread (122, 5; 123, 5; 124, 5; 125, 5; 126, 7; 127, 1; 128, 5; 129, 3; 130, 2; 131, 1): the counts are insufficient for an accurate estimation of significance of differences between total and the typical ventral count.

The supralabials are 7-8 in four, 7-7 in the others. The infralabials are 5-5 in 1 (♂), 6-6 in 47, 6-7 in 17 (11 ♀, 6 ♂), 7-7 in 4 (3 ♀, 1 ♂). In all the preoculars are 1-1; the postoculars are normally 2-2, but fused together on one side in 9 (5 ♀, 4 ♂), on both sides in 7 (4 ♀, 3 ♂); two specimens have 2-3 postoculars. There are two anterior temporals on both sides in two, on one side in six; the secondary temporals are single on one side of one, triple on one side of one, double in others. The loreals are 0-0 in 28 (8 ♀, 20 ♂), 0-1 in 13 (7 ♀, 6 ♂), 1-1 in the remainder. In one the suture between the internasal and prefrontal on one side is incomplete; otherwise the internasals and prefrontals are distinct and separate. On one side of one specimen the prefrontal contacts the labials. The second supralabial contacts the preocular on one side in 10 (5 ♀, 5 ♂), on both sides in 54, on neither side in 5.

The percent of the total length comprised by the tail length varies from 12.7 to 17.6 in 30 females, and from 17.0 to 22.3 in 39 males.

From *lineata varians*, of an adjacent range, *l. wetmorei* differs as follows:

	<i>l. wetmorei</i>	<i>l. varians</i>
ventrals in ♀ -----	83 percent 128 or less (25 of 30)	90 percent 129 or more (26 of 29)
caudals in ♀ -----	83 percent 31 or less (25 of 30)	80 percent 32 or more (21 in 26)
infralabials -----	94 percent 6-7 or less (65 in 69)	90 percent 7-7 or more (57 in 63)

Between these two races there are a number of other differences of considerable significance, but they are of less than 70 percent occurrence. From *l. acuta* there are obvious differences in pattern and in the number of infralabials.

The race with which *l. wetmorei* is to be compared, however, is *l. lineata*. In 64 females and 60 males of the latter, from the states of Guanajuato, Hidalgo, western Mexico, Michoacán, Morelos, Puebla, and San Luis Potosí, the chief difference evident, from *l. wetmorei*, is the number of infralabials. In *l. lineata*, 10 percent have 6-7 infralabials or less while in *l. wetmorei* 94 percent have 6-7 or less. Specimens from eastern Mexico, Distrito Federal, and central western Veracruz (El Limón Totalco, Cruz Blanca, Toxtlacuaya, and between Las Vigas and La Jolla), are intergrades. In 18 specimens from

Cruz Blanca, five have 6-7 or fewer infralabials; two from Toxtla-cuaya, Veracruz, have 7-7 infralabials; these seem typical intergrades. Another series of 35 specimens is from El Limón Totalco, Veracruz; 20 have 6-7 infralabials or less, the remainder 7-7 or 7-8; these are apparently intergrades not only of *l. lineata* and *l. wetmorei*, but also with *l. acuta*, since some specimens have the large dorsal spots of that race. Others (18) from between Las Vigas and La Jolla, Veracruz, are intermediate between *l. wetmorei* and *l. lineata*, with 6-7 or 6-6 infralabials occurring in 12, 7-7 or more in 6. Thirty-three specimens from Distrito Federal and eastern Mexico also appear intermediate between these races; 15 have 67 or fewer infralabials. The area of intergradation of *l. lineata* is therefore of considerable extent, from Distrito Federal east to western Veracruz.

Remarks.—This Veracruzian race is named for Dr. Alexander Wetmore in reference to his studies of the avifauna of that state and in appreciation of the many courtesies extended to my wife and me during my tenure of the Walter Rathbone Bacon Scholarship.

TRIMORPHODON BISCUTATUS BISCUTATUS (Duméril and Bibron)

Trimorphodon biscutatus biscutatus SMITH, Proc. U. S. Nat. Mus., vol. 91, pp. 159-160 (part), 1941.

Seven specimens were secured, one in the state of Chiapas (Tonalá, No. 110409), the others in the state of Oaxaca (Tres Cruces, No. 110403-4; Tehuantepec, Nos. 110405-6; Cerro Guengola, No. 110407; La Concepción, No. 110408).

The Museum has five other specimens, from Tehuantepec, Oaxaca (Nos. 30406, 30427-9), and Santa Efigenia, Oaxaca (No. 46547).

TRIMORPHODON BISCUTATUS SEMIRUTUS, new subspecies

Type.—U. S. N. M. No. 110410, from Acapulco, Guerrero.

Paratypes.—Nine in the EHT-HMS collection, including Nos. 5338-9, El Sabino, Michoacán; Nos. 5145-8, Agua del Obispo, Guerrero; No. 4588, near Organos, Guerrero; No. 21404, La Crucita, Guerrero; and No. 23619, 10 miles north of Tafetán, Michoacán. Also U. M. M. Z. No. 80200, 6 miles northwest of Villa Alvarez, Colima, and No. 80201, Las Orties, Colima.

Diagnosis.—Like *Trimorphodon biscutatus biscutatus*, except ventrals 260 to 275, caudals 85 to 102, total ventral-caudal count 358 to 376, as compared with 251 to 271 ventrals, 81 to 96 caudals, total ventral-caudal counts 343 to 359 of the typical subspecies.

Description of type.—Male: scale rows 23-24-16; ventrals 275; anal divided; caudals 100; supralabials 8-9; infralabials 11-12; preoculars

and postoculars 3-3; loreals 2-2; preocular in contact with frontal; spots on body 20, on tail 13.

Variations.—Twelve specimens of *b. semirutus* from Colima, Michoacán, and Guerrero have a total of 358 to 376 ventrals and caudals (358, 1; 360, 2; 362, 1; 365, 1; 370, 2; 371, 1; 373, 1; 374, 1; 375, 1; 376, 1). Sixteen specimens of *b. biscutatus* from Morelos, Oaxaca, and Chiapas have a total count of 341 to 359 (341, 1; 343, 1; 344, 1; 345, 3; 346, 1; 347, 1; 349, 2; 351, 1; 354, 1; 355, 1; 359, 2). An interlacing of the ranges of the two races in Guerrero and Morelos is indicated by the Morelos specimen (Taylor, 1940, p. 477).

Remarks.—The type was found under an exfoliated slab on the side of a large granite boulder.

*TRIMORPHODON COLLARIS Cope⁹⁹

A single specimen, the type, is in the Museum; it is labeled "Orizaba," Veracruz; it is actually from Tuxpango, near Orizaba (Sumichrast).

TRIMORPHODON FASCIOLATA Smith

Trimorphodon fasciolata SMITH, Proc. U. S. Nat. Mus., vol. 91, pp. 160-162, 1941.

A single specimen, the type (No. 110400), from Zaráracua, 6 miles southeast of Uruapan, Michoacán, is in the collection. It was found under the bark of a dead tree.

The Museum has no other specimens of the species.

TRIMORPHODON FORBESI Smith

Trimorphodon forbesi SMITH, Proc. U. S. Nat. Mus., vol. 91, pp. 163-165, 1941.

A single specimen is from San Diego, near Tehuacán, Puebla (No. 110402); it is the type.

The Museum has no others specimens of the species.

*TRIMORPHODON LAMBDA Cope

Two Mexican specimens are in the Museum, from Guaymas, Sonora (No. 13487, type),¹ and "Sonora" (No. 56321).

*TRIMORPHODON PAUCIMACULATUS Taylor

A single specimen in the Museum is from San Blas, Nayarit (No. 46618).²

⁹⁹ Cope, 1876, p. 131; Smith, 1941t, pp. 165-166.

¹ Cope, 1886, pp. 286-287; Taylor, 1939b, p. 360, pl. 35, fig. 4.

² Smith, 1941t, p. 155.

**TRIMORPHODON TAU Cope*

A single specimen, the type (No. 30328),³ is in the Museum, labeled "Tehuantepec," but is actually from Quiotepec, Oaxaca, according to Sumichrast.

TRIMORPHODON UPSILON Cope

One specimen was found dead in the road 10 km. north of Jacala, Hidalgo (No. 110401). Scale rows 21-23-16; ventrals 226; caudals 63 (♀); supralabials 8-8; infralabials 12-12; preoculars and postoculars 3-3; loreals 2-3; blotches on body 27, on tail, 14.

The Museum has nine other specimens: "Mexico" (Nos. 9911-2, 25361, 26138-9); Guanajuato (No. 11370); Guadalajara (Nos. 12419, 31358); San Juan Capistrano, Zacatecas (No. 46334).⁴

**TRIMORPHODON VILKINSONII Cope*

A single Mexican specimen, the type (No. 14268),⁵ is in the Museum, from "Chihuahua."

TROPIDODIPSAS SARTORII SARTORII Cope

Three specimens were obtained, one (No. 109909) at Potrero Viejo, Veracruz; another (No. 109908) at Tenosique, Tabasco; and a third (No. 109907) at Emiliano Zapata, Tabasco.

The Museum has only one other specimen of this race, from Chuntunquí, Guatemala (No. 71361). Aside from these I have examined another from Potrero Viejo, Veracruz (EHT-HMS No. 21809), and four in the Museum of Comparative Zoology, three of which are from Alvarez, San Luis Potosí (Nos. 25002-4), the other from Tamazunchale, San Luis Potosí (No. 45689). In three specimens of this entire series the loreal enters the orbit on both sides (Nos. 109907, 25002, 25003), and in one specimen it enters the orbit on one side (No. 25004). In one the nasal contacts a lower preocular below the loreal (No. 21809), and in No. 25002 the temporal enters the orbit on one side. Other details of variation are given in table 42. The dorsal scales are feebly keeled in all.

In one Potrero specimen and in the Guatemala specimens the only light band complete about the body is the nuchal collar; the remaining light bands reach the edges of the ventrals and caudals. In the other Potrero specimen (No. 21809) 10 of the 13 body bands are very narrowly interrupted medially. In the Tenosique specimen all the light bands are complete about the body, except one immediately preceding the anus. In the Zapata specimen most of the bands are nar-

³ Cope, 1869, p. 152; Taylor, 1939b, p. 374, fig. 8, pl. 51.

⁴ Taylor, 1939b, p. 366.

⁵ Cope, 1886, pp. 285-286.

TABLE 42.—*Variation in Tropidodipsas sartorii sartorii*

No.	Sex	Ventrals	Caudals	Supralabials	Infralabials	Preoculars	Postoculars	Body bands	Tail bands
25002	♂	176	63	7-7	9-9	1-1	2-2	18	6
71361	♂	185	64	7-7	8-9	2-2	2-2	22	7
109908	♂	180	65	7-7	9-9	2-2	2-?	24	8
109907	♂	184	61	7-7	10-10	2-2	2-2	20	6
25003	♀	180	58	6-6	8-?	1-?	?-?	16	6
25004	♀	179	56	7-7	9-10	3-3	2-2	21	5
45689	♀	176	63	7-7	9-?	2-2	2-2	17	5
109909	♀	182	61	7-7	9-9	2-2	2-2	15	5
21809	♀	183	59	7-7	9-9	3-4	2-2	13	4

rowly interrupted on the midventral surface. All the San Luis Potosí specimens have complete light rings. Some of the dorsal scales in the light bands are black-tipped in all. In all my specimens the nuchal collar was yellow in life, the remaining light bands red.

Eventually it may be possible to discern more than one subspecies in this apparently very variable form. The color variants now known, however, do not segregate very well geographically. A specimen with all the annuli complete is recorded by Boulenger (1891, p. 297) from Orizaba, while mine from Potrero has the entire midventral surface black; Boulenger's specimen probably agrees more closely with the San Luis Potosí specimens. My southern snakes show the bands tending toward completeness ventrally, yet the specimen from Guatemala shows the midventral surface entirely black.

The number of bands seems to be associated with sex. The four females have 15 to 21 body and 5 to 6 caudal bands, while four males have 18 to 22 body and 6 to 8 caudal bands.

TROPIDODIPSAS SARTORII ANNULATUS (Peters)

Two specimens were secured, one (No. 109910) from Finca Juárez, Chiapas, the other from La Esperanza, Chiapas (No. 109911). Both were found at night near trails through the forests.

Two other specimens of this form have been examined, one (No. 46436) from Chicharras, Chiapas, the other (No. 12689) from Escuintla, Guatemala. In these four specimens, the supralabials are 6-7 in two, 7-7 in two; infralabials 8-9 in two, 9-9 in one, 9-10 in one; postoculars 2-2 in all; preoculars 2-2 in two (loreal enters orbit in one of these, passing between preoculars), 1-1 in two; in the two latter, the loreal enters the orbit below the preocular in one, and in the other it enters above the preocular and below a narrow extension of the prefrontals which also enter the orbit. The ventrals are 175, 177,

173, 181, respectively, as listed above; caudals 59♀, 58♀, 64♂, 54♀, respectively. In three females the dark bands are 14 or 15 on the body, 5 or 6 on the tail; in the single male the body bands are 18, tail bands 6. The dorsal scales in the light bands are usually black-tipped (not in No. 109910). All the light bands are light yellow, and complete about the body.

The form differs from typical *sartorii* chiefly in (1) regularity of the bands, and (2) light bands all yellow. In *s. sartorii* the bands are complete or incomplete ventrally, and tend to be somewhat variable, while in *s. annulatus* they are very even and regular. In the latter they are broader than in most *s. sartorii*, and perhaps average less numerous. In *annulatus* all the light bands are yellow, while in *s. sartorii* only the nuchal collar is yellow, the remaining bands red.

I may add here a few notes on another species, *Tropidodipsas philippii*, of which one specimen (M. C. Z. No. 11410) from "Colima" has been examined. It is a male with 15-15-15 scale rows, 181 ventrals, single anal, 85 caudals, 8-8 supralabials (fifth and sixth entering orbit on one side, fourth also on other), 9-9 infralabials, 2-2 preoculars and postoculars, and 1-2 temporals; the prefrontals enter the orbit on both sides, above the preoculars; the loreal does not enter the orbit; total length 519 mm., tail 142 mm. There are feeble but distinct keels on the dorsal scales posteriorly and numerous pits on the scales of the ventral surface of the head. On the body there are about 11 long, dark cross bands narrowly separated from each other by light rings (several broken medially and alternating) covering two or three scale lengths medially, four or five laterally; on the tail there are nine similar black rings. The belly is mostly light, the black rings involving the ends (one-third or one-fourth on each side) of the ventrals. In caudal count this snake broadly overlaps the count of *occidentala*, an obviously related species with 81 caudals; other *philippii* have 67 to 71. Nevertheless, *occidentala* appears to be well differentiated from *philippii* on the basis of ventral color (all black except where light rings cross belly) and the total absence of keels on the dorsal scales.

TYPHLOPS BASIMACULATUS Cope

One specimen (No. 110304) is from Potrero Viejo, Veracruz, collected by Dyfrig McIl. Forbes. Dorsals 379; caudals 9; scale rows 18. I follow Taylor in restricting *tennis* to Guatemala, pending further collections from intermediate territories.

The Museum has three others, from Córdoba and Orizaba, Veracruz (Nos. 6344 [2], 6602).

TYPHLOPS BRAMINUS (Daudin)

One specimen (No. 110510) was collected at Agua del Obispo, Guerrero, under a log shortly after a rainstorm.

The Museum has no others of the species from Mexico.

**TYPHLOPS MICROSTOMUS* Cope

Two specimens are in the Museum, both from "Yucatán" (Nos. 6569, 61064, type).⁶

XENODON MEXICANUS Smith

Six specimens are as follows: Piedras Negras, Guatemala (No. 108596, type); Potrero Viejo, Veracruz (No. 110329); La Esperanza, Chiapas (Nos. 110330-2); and Salto de Agua, Chiapas (No. 110333).

The ventrals in this series vary between 126 and 137; caudals 40 to 46; supralabials 8-8 (7-8 in one); infralabials 8-9 in one, 9-9 in two, 10-10 in one; two preoculars on one side in one; three postoculars on one side in one, others with two; crossbars 13-3 (body and tail) in two, 13-4 in one, 14-3 in one, 14-4 in one. The bands are very distinct and complete about the body in the very young.

The Museum has no other Mexican specimens.

CROCODILIA

CAIMAN FUSCUS (Cope)

Fifteen specimens (Nos. 115337-51) are from the vicinity of Colonia Soconusco, Chiapas, and three others (Nos. 115334-6) are from Belén, Chiapas. They were found in sluggish streams and in ponds by several of the local hunters.

The Museum has no others from Mexico.

CROCODYLUS ACUTUS Cuvier

Two skulls (Nos. 115352-3) were picked up on the beach at Laguna Coyuea, near Acapulco, Guerrero. One small specimen, preserved entire, is from Río Hondo, near San Bartolo (east of Miahuatlán, Oaxaca (No. 115354). The premaxillo-maxillary sutures are produced posteriorly to the level of the posterior border of the seventh tooth in all.

The Museum has one other specimen from Mexico, from Colima (No. 56777); another very small specimen from Tabasco (No. 6624) may belong to the same species.

⁶ Cope, 1866, p. 125.

CROCODYLUS MORELETHI Duméril

Seven specimens are from the following localities: CHIAPAS: Palenque (Nos. 115358-60). TABASCO: Tenosique (Nos. 115356-7). VERACRUZ: Maguay, near Tampico (No. 115361). GUATEMALA: Río Usumacinta, near Piedras Negras, Petén (No. 115355).

The Museum has no other specimens from Mexico.

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THE NORTH AMERICAN PARASITIC WASPS OF THE
GENUS *TETRASTICHUS*—A CONTRIBUTION TO BIO-
LOGICAL CONTROL OF INSECT PESTS

By B. D. BURKS*

THE genus *Tetrastichus* Haliday (Hymenoptera: Eulophidae) includes a large number of species of minute chalcid-flies. These may be either primary parasites or hyperparasites, and they attack a wide variety of hosts (see host list hereinafter), including such destructive pests as the Hessian fly and the cotton boll weevil and many kinds of thrips, aphids, midges, leaf miners, scales, tent caterpillars, borers, roaches, beetles, and gall-makers injurious to agriculture, horticulture, and forestry. They have been reared from the eggs, larvae, and pupae of other insects, as well as from many plant galls. Economically, therefore, this is an important group of the Chalcidoidea, and a thorough understanding of its species and relationships is desirable. Twenty-three species are herein described for the first time.

From a taxonomic standpoint this genus is a difficult one for several reasons. The species are so small that very good microscope equipment is needed for studying them. Specimens are only lightly sclerotized, so that they almost invariably shrivel badly in drying; this tends to conceal or distort their morphological characters. It has not, however, been possible satisfactorily to study specimens preserved in alcohol or on slides. There is, furthermore, a great lack of good, definite morphological characters for the separation of species

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in this genus. Color differences alone are seldom reliable for the separation of species, but, in some cases, only color characters could be found.

The males of *Tetrastichus* often exhibit good differences in the antennae and genitalia, but males are so rare that a useful classification cannot be based on them. Females of a given species are generally ten or more times as numerous as are the males; in one-third of the species in this genus males are unknown, and in some forms males apparently do not exist. Finally, the study of the species in this genus is greatly impeded by the very poor condition of many of the types.

A. B. Gahan, of the U. S. Bureau of Entomology and Plant Quarantine, has taken an active interest in the completion of this synopsis, and many of the decisions as to specific limits, validity of characters, and synonymy have been made in consultation with him. He also generously allowed me to make full use of his notes and a manuscript key to part of the genus; the latter contained several valuable characters for the segregation of species.

In 1843, Haliday¹ described the genus *Tetrastichus* in a paper giving his somewhat preliminary classification of the chalcid-flies. The genus is monobasic, with *Cirrospilus attalus* Walker clearly indicated as the type. Walker apparently accepted this generic segregate at once, as he published the description of a new species in *Tetrastichus* the following year,² and, shortly thereafter, transferred many of his species, previously described in *Cirrospilus*, to *Tetrastichus*.³ Walker,⁴ also, treated *Aprostocetus* Westwood as a synonym of *Tetrastichus*, but that, according to present-day standards of taxonomic procedure, would be impossible, as *Aprostocetus* is the older of the two names.

Foerster, in 1856,⁵ published his comprehensive classification of the chalcids and acknowledged the fact that it was based largely on the works of Haliday and Walker. Foerster, however, distributed the genera of chalcid-flies among more than 20 families. *Tetrastichus* was made the type genus for one of these families. The genera *Triphasius* Foerster, *Anozus* Foerster, *Pteroptrie* Westwood, *Trichaporus* Foerster, *Ceranixus* Walker, *Baryscapus* Foerster, *Hypertiles* Foerster, and *Tetrastichus* Haliday were grouped together to form the family Tetrastichoidae.⁶ In his discussion of the genus *Tetrastichus*,⁷

¹ Trans. Ent. Soc. London, vol. 3, p. 297, 1843.

² Ann. Mag. Nat. Hist., vol. 14, p. 17, 1844.

³ List of the specimens of hymenopterous insects in the collection of the British Museum, Chalcididae, 237 pp. in 2 vols., London, 1846-1848.

⁴ Loc. cit., p. 78.

⁵ Hymenopterologische Studien, vol. 2, 152 pp., Aachen, 1856.

⁶ Loc. cit., p. 83.

⁷ Loc. cit., p. 86.

Foerster stated that he considered Walker to have been correct in combining *Aprostocetus* and *Tetrastichus* but that in the future if the species with an elongate ovipositor were segregated generically they should be placed under the name *Aprostocetus*, with *Lonchentedon* Ratzeburg as a generic synonym.

When Walker published his final classification of the chalcid-flies,⁸ he treated the genera of the family Tetrastichidae briefly, but his classification differs very little from Foerster's. Walker, even at that comparatively late date, continued to regard *Aprostocetus* as a synonym of *Tetrastichus*,⁹ although observance of the right of priority had become quite general by that time.

In 1878, Thomson¹⁰ published keys and descriptions for the Scandinavian species of *Tetrastichus*, listed *Aprostocetus* Westwood and *Lonchentedon* and *Geniocerus* Ratzeburg as generic synonyms, and transferred a number of species from *Eulophus* and *Entedon* to *Tetrastichus*.

Howard, a few years later, keyed out the genera of the chalcids but did not modify the concept of the genus *Tetrastichus* prevailing in the works of European authors.¹¹ When Ashmead published his classification of the suprageneric categories of his superfamily Chalcidoidea,¹² he considered Foerster's family Tetrastichoidae (or Walker's Tetrastichidae) as the subfamily Tetrastichinae of the Eulophidae. In his classification of the chalcid-flies down to genera, Ashmead included 13 genera in the Tetrastichinae.¹³ He considered *Tetrastichus* and *Aprostocetus* to be distinct, and listed *Geniocerus* and *Trichoceras* Ratzeburg as synonyms of the former. He cited *Eulophus miser* Nees as the genotype of *Tetrastichus*, apparently because of the fact that Dalla Torre¹⁴ had listed *Cirrospilus attalus* as a synonym of *Eulophus miser*.

Ashmead grouped *Malittobia* Westwood, *Tetrastichodes* Ashmead, *Trichaporus* Foerster, *Hyperteles* Foerster, *Gyrolasia* Foerster, *Syntomosphyrum* Foerster, *Ceraniscus* Walker, *Baryscapus* Foerster, *Aprostocetus* Westwood, *Crataepus* Foerster, and *Pentastichus* Ashmead with *Tetrastichus* in the tribe Tetrastichini and, making a tribe Ceratoneurini for the genus *Ceratoneura* Ashmead, placed these two tribes in the subfamily Tetrastichinae. Five years later, Schmiedeknecht¹⁵ used Ashmead's classification almost without change but pointed out that the genus *Oomyzus* Rondani is a synonym of *Tetrastichus*.

⁸ Notes on Chalcidiae, 129 pp. in 7 pts., London, 1871-1872.

⁹ Loc. cit., p. 113.

¹⁰ Hymenoptera Scandinaviae, vol. 5, p. 278, 1878.

¹¹ Ent. Amer., vol. 2, p. 100, 1886.

¹² Proc. Ent. Soc. Washington, vol. 4, p. 249, 1897.

¹³ Mem. Carnegie Mus., vol. 1, p. 348, 1904.

¹⁴ Catalogus hymenopterorum, vol. 5, p. 18, 1898.

¹⁵ Genera insectorum, fasc. 97, p. 471, 1909.

In 1913, Kurdjumov¹⁶ published the results of his extensive researches on *Tetrastichus* and its allies. His conclusions were based on a careful study of almost all the types involved, so these conclusions may be accepted without question. Kurdjumov showed that *Trichaporus* is a synonym of *Astichus* Foerster (belonging in the subfamily Entedoninae), and *Gyrolasia* is the same as *Pteroptria* Westwood (a member of the subfamily Aphelininae). He also considered *Syntomosphyrum*, *Ceranissus*, and *Baryscapus* to be synonyms of *Tetrastichus*. He resurrected the genus *Geniocerus*, however, for those species, formerly placed in *Tetrastichus*, which have more than one dorsal bristle on the submarginal vein of the forewing, and restricted *Tetrastichus* to those species with but one dorsal bristle. He used the name *Aprostocetus* for those species having a long, exerted ovipositor. Kurdjumov confirmed the fact that *Cirrospilus attalus* is a synonym of *Eulophus miser*, and, since he presumably saw the types of both species, this synonymy may be accepted without further question.

The following year, Gahan published a key to the few Nearctic species then known to him that would be referable to the genus *Tetrastichus* as defined by Kurdjumov.¹⁷ Crawford¹⁸ was of the opinion that Kurdjumov's definition of *Tetrastichus* and *Geniocerus* was unsatisfactory but that nothing better was available. Since that time, the genus *Geniocerus* has been used by few authors, but, for the rest, Kurdjumov's findings have been quite generally followed.

Beginning in 1912 and for several years following, A. A. Girault published descriptions of numerous new genera and species of Tetrastichinae, many of which must be considered in treating *Tetrastichus* in the Nearctic region. Girault based his work almost entirely on Ashmead's classification. Many of Girault's generic names were proposed originally for Australian species, but a large number of these genera were used by him when he later described species from North America. As authentic material of the genotypes of these genera is not available, it is difficult to form reliable conclusions regarding their validity. A study of the North American species that he placed in these genera leads to the conclusion that many of them should be considered as synonyms of *Tetrastichus*, but study of the genotypes themselves very well might show that at least some of them should be retained for Australian and other non-Nearctic species. Some of Girault's genera, however, can safely be synonymized after studying material he referred to them; others must be left in abeyance for the time being.

Girault was not always consistent in his treatment of his genera. For example, he described the genus *Aprostoceroloides* in his first ac-

¹⁶ Russ. Ent. Obozr. (Rev. Russe Ent.), vol. 13, p. 242, 1913.

¹⁷ Proc. U. S. Nat. Mus., vol. 48, p. 166, 1914.

¹⁸ Proc. U. S. Nat. Mus., vol. 48, p. 584, 1915.

count of the Eulophidae of Australia,¹⁹ but in the supplement to this work he listed this genus as a synonym of his *Trichaporoidella*.²⁰ Later he evidently decided that the two genera were not the same, as he placed one of his new species from the United States²¹ in the genus *Aprostoceroloides*. The characters given in the original descriptions of *Aprostoceroloides* and *Trichaporoidella* would not suggest that they are the same, and my opinion is that *Aprostoceroloides* is a synonym of *Tetrastichus*, while *Trichaporoidella* is more than likely the same as *Syntomosphyrum*. It also might fairly be said that it is often difficult to reconcile Girault's generic assignments of his North American species with the characters he gave for those genera when he described them.

My own conclusions regarding the limitation of *Tetrastichus* and its related genera differ little from those of Kurdjumov. I do not, however, agree with him that *Syntomosphyrum* is a synonym of *Tetrastichus*, as I consider the two groups recognizably distinct. Furthermore, the use of the name *Geniocerus* seems unnecessary; the species referred to that genus may well be placed in *Tetrastichus*. The genus *Ceraninus*, as identified by Ashmead (and apparently by Kurdjumov as well), is not the same as Walker's genus as originally described. *Ceraninus* Ashmead, not Walker, is undoubtedly the same as *Tetrastichus*, but *Ceraninus* Walker (having but two funicle segments) is close to *Pentastichus* Ashmead.

The true genus *Hyperteles* has not, so far, been found to occur in North America. Most of the Nearctic species which have been described in *Hyperteles*, however, belong in *Tetrastichus*. Although I have transferred a number of species from *Ootetrastichus* Perkins to *Tetrastichus*, I do not consider *Ootetrastichus* a synonym of *Tetrastichus*. The genera *Thymus*²² and *Prothymus*,²³ described by Girault, and related to *Tetrastichus*, seem to be recognizably distinct, although the available material of them is in extremely poor condition.

Genus TETRASTICHUS Haliday

- Tetrastichus* HALIDAY, Trans. Ent. Soc. London, vol. 3, p. 297, 1843.—KURDJUMOV, Russ. Ent. Obozr. (Rev. Russe Ent.), vol. 13, p. 253, 1913.—GAHAN, Proc. U. S. Nat. Mus., vol. 48, p. 166, 1914. (Type, *Cirrospilus attalus* Walker.)
- Trichoceras* RATZBURG, Die Ichneumonien der Forstinsecten . . . , vol. 2, p. 171, 1848. (Type, *Trichoceras erythrophthalmus* Ratzeburg.)
- Geniocerus* RATZBURG, Die Ichneumonien der Forstinsecten . . . , vol. 2, p. 175, 1848. (Proposed unnecessarily for *Trichoceras* Ratzeburg, 1848, which was thought to be preoccupied by *Trichocera* Meigen, 1803.)

¹⁹ Mem. Queensland Mus., vol. 2, p. 243, 1913.

²⁰ Mem. Queensland Mus., vol. 3, p. 229, 1915.

²¹ Chalcidoidea nova Marilandensis, pt. 2, p. 2, 1917.

²² Can. Ent., vol. 48, p. 113, 1916.

²³ New chalcid flies, p. 1, 1917.

- Baryscapus* FOERSTER, Hymenopterologische Studien, vol. 2, p. 84, 1856. (Type, *Baryscapus centricolae* Ashmead.)
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- Tetrastichodes* ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 203, 1887. (Type, *Tetrastichodes floridanus* Ashmead.)
- Ceraninus* ASHMEAD (not Walker), Mem. Carnegie Mus., vol. 1, p. 349, 350, 1904.
- Neotetrastichus* PERKINS, Bull. Hawaiian Sugar Planters' Assoc. Exp. Stat., Ent. Ser., vol. 10, p. 14, 1912. (Type, *Neotetrastichus mimus* Perkins.) (New synonymy.)
- Epitetrastichus* GIRAULT, Mem. Queensland Mus., vol. 2, p. 265, 1913. (Type, *Epitetrastichus speciosissimus* Girault.) (New synonymy.)
- Neomphaloidella* GIRAULT, Trans. Roy. Soc. South Australia, vol. 37, p. 69, 1913. (Type, *Neomphaloidella fasciativentris* Girault.) (New synonymy.)
- Neotetrastichodes* GIRAULT, Mem. Queensland Mus., vol. 2, p. 228, 1913. (Type, *Neotetrastichodes flavus* Girault.) (New synonymy.)
- Epomphaloides* GIRAULT, Arch. für Naturg., vol. 79A, No. 6, p. 49, 1913. (Type, *Epomphaloides flavus* Girault.) (New synonymy.)
- Aprostoceroloides* GIRAULT, Mem. Queensland Mus., vol. 2, p. 243, 1913. (Type, *Aprostoceroloides speciosus* Girault.) (New synonymy.)
- Blattotetrastichus* GIRAULT, Ent. News, vol. 28, p. 257, 1917. (Type, *Entedon hagenowii* Ratzeburg.) (New synonymy.)

The following combination of characters will differentiate the members of the genus *Tetrastichus* from all other members of the superfamily Chalcidoidea:

Margin of clypeus with a pair of toothlike projections (fig. 17, *a*); antennae never inserted at or immediately dorsad of clypeal margin; maxillary and labial palps each composed of one segment; mandibles each with three teeth; female antenna with three funicle segments, male with four, club in both sexes composed of three segments, terminal two often more or less fused, club always with a minute terminal style; eyes with sparse, short hairs; pronotum narrow, transverse (figs. 18, 19); front and middle tibiae slender; all tarsi with four segments; front wing with a break where Rs diverges from the stem of R, submarginal vein of front wing with from one to seven dorsal bristles; marginal vein always longer than stigmal vein, postmarginal vein wanting, no trace remaining of vein M; axillae produced anteriorly far in advance of tegulae; mesoscutellum with two longitudinal, dorsal grooves (fig. 18); hindwing with three hamuli (fig. 20, *f*); abdomen often with a rudimentary petiole (fig. 21, *b*); but never distinctly petiolate; ovipositor not markedly exerted (fig. 21, *g-i*).

KEY TO SPECIES

- Ovipositor sheaths short, thickened, and somewhat flattened (fig. 21, *g*)----- 2
Ovipositor sheaths elongate, more slender, as in fig. 21, *h, i*----- 3
- Gaster nearly circular in outline, ovipositor sheaths densely covered with short, stout setae (fig. 21, *g*)----- *chrysopae* (Crawford) (p. 525)
Gaster fully twice as long as broad, sheaths with only three or four weak setae----- *thripophonus* Waterston (p. 525)
- Gaster as long as thorax; body very dark brown or black, noniridescent; submarginal vein of forewing with one dorsal bristle; mesopraescutum with one row of bristles at each lateral margin, this row consisting of only three

or four long bristles; apices of ovipositor sheaths usually just reaching apex of abdomen, occasionally not quite reaching apex.

johnsoni Ashmead (p. 526)

- Not having that combination of characters----- 4
4. Apices of sheaths and ovipositor, when in repose, not reaching apex of abdomen, as in fig. 21, *i*----- 5
- Apices of sheaths and ovipositor, when in repose, reaching or slightly exceeding apex of abdomen, as in fig. 21, *h*----- 11
5. Marginal and stigmal veins of forewing almost equal in length, the latter nearly three-quarters as long as the former---- *lissus*, new species (p. 527)
- Marginal vein at least twice as long as stigmal vein----- 6
6. Mesopraescutum with two or three rows of bristles at each lateral margin; dorsal surface of thorax dull, and with dense, well-marked scalelike reticulations----- *ichthus*, new species (p. 528)
- Mesopraescutum with only one row of bristles at each lateral margin; dorsal surface of thorax rather shining, and with shallow scalelike reticulations, or lacking such sculpture entirely----- 7
7. Thorax black or brown, noniridescent----- 8
- Thorax bright, iridescent green or blue-green----- 10
8. Metatibiae partly dark brown or black----- *melanis*, new species (p. 529)
- Metatibiae entirely light yellow or white----- 9
9. Femora partly brown; stigmal vein of forewing short, subsessile, as in fig. 20, *b*)----- *brevistigma* Gaban (p. 530)
- Femora entirely light yellow or white; stigmal vein of forewing long, as in fig. 20, *a*----- *pandora*, new species (p. 530)
10. Antennal club twice as long as third funicle segment; third funicle segment nearly twice as long as broad; scape almost always yellow; mandibles and mouth opening reduced in size (fig. 17, *a*)-- *hyalomae* (Ashmead) (p. 531)
- Antennal club two and one-half times as long as third funicle segment; third funicle segment only slightly longer than broad; scape almost always brown; mandibles and mouth opening large (fig. 17, *b*)--*asparagi* Crawford (p. 532)
11. Mesopraescutum with only one bristle at each lateral margin (fig. 18, *d, e*)-- 12
- 18, *d, e*)----- 12
- Mesopraescutum with two or more bristles at each lateral margin, or with one to several rows of bristles at each lateral margin, or with bristles distributed over entire sclerite, as in figs. 17, *b, c*; 18, *a-c*----- 19
12. Anterior pair of scutellar bristles longer than posterior pair (fig. 18, *e*); thorax black or brown, marked with yellow, sometimes almost entirely black----- *flora* (Girault) (p. 523)
- All scutellar bristles equal in length or posterior pair longer; thorax never yellow and brown; either iridescent blue or green, or entirely dark brown or black----- 13
13. Thorax iridescent green----- *hillmeadia* (Girault) (p. 534)
- Thorax very dark brown or black, noniridescent----- 14
14. Gaster entirely dark brown, or mostly dark brown with base tan. *solidaginis*, new species (p. 534)
- Gaster partly or almost entirely white----- 15
15. Abdomen almost entirely white; brown only along dorsolateral margins-- 16
- Abdomen white only at base----- 18
16. First and second funicle segments equal in length. *pulchriventris* (Girault) (p. 535)
- Second funicle segment longer than first----- 17
17. All femora white----- *ulysses* (Girault) (p. 536)
- Front and mid femora partly brown--*semilongifasciatus* (Girault) (p. 536)

18. Length of ocellocular line nearly twice as great as maximum diameter of lateral ocellus; propodeum long, its mesal length one-third as great as length of mesoscutellum; all femora light yellow or white; male antenna with long bristles, as in fig. 16, *l*----- *ainsliei* Gahan (p. 537)
Length of ocellocular line only slightly greater than maximum diameter of lateral ocellus; propodeum shorter, its mesal length only one-sixth as great as length of mesoscutellum; front and middle femora partly tan; male antenna with short bristles, as in fig. 16, *j*----- *whitmani* (Girault) (p. 538)
19. Mesopraescutum with numerous, slightly irregular longitudinal rugae on meson, and whole dorsum of thorax with extremely coarse sculpture.
gelastus, new species (p. 539)
Mesopraescutum without longitudinal rugae on meson; dorsum of thorax not so coarsely sculptured----- 20
20. Body very dark, iridescent blue or blue-green; propodeum extremely short, its mesal length only one-fifth as great as length of mesoscutellum; abdomen long and narrow, at most only one-half as wide as maximum width of thorax; base of gaster broadly joined to propodeum; propodeal spiracles minute, almost round and nearly touching anterior margin of propodeum.
malacosomae Girault (p. 539)
Not having that combination of characters----- 21
21. Submarginal vein of forewing with only one dorsal bristle, as in fig. 20, *a-c*----- 22
Submarginal vein of forewing with two to seven dorsal bristles----- 36
22. Only two bristles present at each lateral margin of mesopraescutum----- 23
At least three bristles present at each lateral margin of mesopraescutum----- 25
23. Thorax elongate, with mesopraescutum as long as wide; postscutellum and propodeum smooth; anterior and posterior praescutal bristles approximately the same size----- *baldufi*, new species (p. 540)
Thorax broad and compact, with mesopraescutum much wider than long; postscutellum and propodeum with distinct, netlike sculpturing; posterior praescutal bristles larger and longer than anterior ones----- 24
24. Surface of forewing uniformly ciliated on area just distad of point of conjunction of submarginal and marginal veins (fig. 20, *e*); antennae slender, elongate, first funicle segment twice as long as broad, club only slightly wider than third funicle segment (fig. 16, *h*); metatibiae almost always entirely yellow----- *dyrus*, new species (p. 541)
Surface of forewing with a large bare area just distad of point of conjunction of submarginal and marginal veins (fig. 20, *d*); antennae more compact, first funicle segment as broad as long, club considerably wider than third funicle segment (fig. 16, *i*); metatibiae always partly dark brown or black----- *triozae*, new species (p. 542)
25. Body dark, iridescent blue; scape yellow and quite short, its apex far from reaching level of anterior ocellus; flagellum brown; femora mostly dark brown or black; gaster slender, not so wide as thorax, but only slightly longer than thorax; stigmal vein of forewing with a slender anterior spur (fig. 20, *c*); propodeal spiracles separated from anterior margin of propodeum by space equal to the diameter of a spiracle.
ovipransus Crosby and Leonard (p. 544)
Not having that combination of characters----- 26
26. Propodeum with a median carina, but without paraspiracular carinae, as in fig. 21, *e, f*; surface of propodeum smooth or very weakly sculptured----- 27
Propodeum with both median and paraspiracular carinae, as in fig. 21, *a-d*; surface of propodeum strongly shagreened or sculptured----- 28

27. Thorax dark, iridescent blue-green or green; propodeum weakly reticulated.
xanthomelaenae (Rondani) (p. 544)
 Thorax dull brown, noniridescent; propodeum smooth.
compisivorus Crawford (p. 545)
28. Metafemora entirely light yellow or white----- 29
 Metafemora partly or almost entirely dark brown, black, or iridescent--- 30
29. Dorsum of thorax with greenish iridescence; outer surface of metacoxae
 strongly pitted----- *euplectri* Gahan (p. 546)
 Dorsum of thorax bright, iridescent blue-green; outer surface of meta-
 coxae with very weak and shallow indentations.
aeneoviridis (Girault) (p. 547)
30. Apex of hindwing acute, fringe at posterior margin one-half as wide as
 wing at hamuli, as in fig. 20, *h*----- 31
 Apex of hindwing blunt, fringe at posterior margin not more than one-third
 as wide as wing at hamuli----- 32
31. Second funicle segment slightly longer than first; mesal length of pro-
 podeum one-fifth as great as length of mesoscutellum.
diarthronomyiae Gahan (p. 547)
 First and second funicle segments equal in length; mesal length of pro-
 podeum one-third as great as length of mesoscutellum.
tibialis (Ashmead) (p. 548)
32. Mesotibiae almost entirely dark brown----- *scolyti* Ashmead (p. 548)
 Mesotibiae entirely light yellow or white----- 33
33. Sides of pronotum with a deep femoral groove (fig. 17, *e*); body deep,
 iridescent blue----- *agrili* Crawford (p. 549)
 Sides of pronotum without a femoral groove, as in fig. 17, *d*; body brown
 or black with iridescent greenish or brassy cast, or iridescent green-- 34
34. Apex of antennal scape reaching level of vertex; thorax iridescent green.
scriptus, new species (p. 550)
 Apex of antennal scape not surpassing level of ventral margin of anterior
 ocellus; thorax dark brown or black, with faint iridescent greenish or
 brassy cast----- 35
35. Antennal scape and pedicel uniformly brown; body very dark brown, with
 faint greenish iridescence----- *productus* Riley (p. 550)
 Antennal scape and apex of pedicel light yellow or white, base of pedicel
 brown; body black or very dark brown with brassy cast.
paracholus, new species (p. 551)
36. Head considerably broader than pronotum; entire dorsum of thorax covered
 by close, scalelike reticulations, as in fig. 18, *c*, and very dark steel-blue or
 shining black (old or teneral specimens may be brown); entire surface of
 gaster shagreened----- 37
 Dorsum of thorax differently sculptured; surface of gaster usually not com-
 pletely shagreened----- 38
37. Marginal vein of forewing four to four and one-half times as long as
 stigmal; funicle segments of antenna long, slender; first segment three
 and one-half times as long as broad----- *tesserus*, new species (p. 552)
 Marginal vein of forewing only two and one-half to three times as long as
 stigmal; first funicle segment twice as long as broad.
fumipennis (Girault) (p. 553)
38. Body dark brown or black, sometimes with indistinct iridescent reflections,
 and with middle and hind coxae entirely light yellow or white----- 39
 Not having that combination of colors: body and middle and hind coxae
 either both yellow, or body brown, black, or iridescent with coxae partly
 or entirely dark----- 40

39. Mesopraescutum with bristles distributed over its entire surface, as in fig. 19, *e*----- hagenowii (Ratzeburg) (p. 554)
Mesopraescutum with bristles at lateral margins only.-----
cassidis, new species (p. 555)
40. Body elongate, slender; head rounded, with antennae inserted approximately in center of frons, well above level of ventral margins of compound eyes, as in fig. 16, *a*; postocellar line only slightly, if at all, longer than ocellular line----- 41
Antennae inserted at or near level of ventral margins of compound eyes, and much below center of frons; postocellar line at least one and one-half times as long as ocellular----- 43
41. Body iridescent blue----- semiauraticeps (Girault) (p. 556)
Body dull brown, or brown and yellow----- 42
42. Ocelli in a nearly straight line; apex of scape reaching level of anterior ocellus, first funicle segment twice as long as broad.-----
longicorpus (Girault) (p. 557)
Ocelli forming a low triangle, apex of scape exceeding level of vertex; first funicle segment three times as long as broad.-----
oklahoma (Girault) (p. 557)
43. Mesoscutellum bearing five pairs of bristles, three of which are located along posterior margin of this sclerite; mesopraescutum bearing several rows of silver-colored bristles at each lateral margin-- argyrus, new species (p. 558)
Mesoscutellum almost always bearing only two pairs of bristles, sometimes with three or four pairs----- 44
44. Mesoscutellum with four pairs of bristles; mesopraescutum with three rows of bristles at each lateral margin; length of malar space two-thirds as great as height of compound eye, antennae inserted slightly ventrad of level of ventral margins of compound eyes----- phegasus, new species (p. 559)
Mesoscutellum with two or three pairs of bristles----- 45
45. Length of malar space slightly greater than height of compound eye; antennae inserted slightly ventrad of level of ventral margins of compound eyes, apex of scape reaching level of vertex; abdomen elongate, slender, twice as long as thorax and propodeum combined; marginal vein twice as long as stigmal----- gigas, new species (p. 560)
Length of malar space less than height of compound eye----- 46
46. Color black with faint green or blue-green iridescent reflections; body elongate, narrow; gaster one and three-fourths to twice as long as thorax and propodeum combined; antennae inserted slightly ventrad of level of ventral margins of compound eyes; length of malar space four-fifths as great as height of compound eye----- holbeini Girault (p. 561)
Not having that combination of characters----- 47
47. Mesopraescutum with bristles distributed over entire surface, as in fig. 19, *e*; or, at least, with more than two rows of bristles at each lateral margin-- 48
Mesopraescutum with one or two rows of bristles at each lateral margin-- 56
48. Bristles of mesopraescutum distributed over entire surface in a rather haphazard manner; some bristles contiguous with mesal furrow, as in fig. 19, *e*----- 49
Mesopraescutal bristles not present on meson; three to five rows of bristles present at each lateral margin, but none contiguous with mesal furrow, as in fig. 19, *b*, *d*----- 52
49. Metatibiae almost entirely dark brown or black-- modestus Howard (p. 562)
Metatibiae entirely light yellow or white----- 59

50. Malar furrow curved and forming, with ocular suture, a triangle at ventral margin of compound eye (fig. 16, *c*), length of malar space two-thirds as great as height of compound eye----- *pattersonae* Fullaway (p. 563)
Malar furrow straight (fig. 16, *b*); length of malar space one-half as great as height of compound eye----- 51
51. Antennal club short, ovate, less than twice as long as second funicle segment; body usually bright, iridescent green, with femora entirely light yellow or white; forewing of male with a conspicuous patch of dark setae on anterior margin near apex----- *spilopteris*, new species (p. 564)
Antennal club almost three times as long as second funicle segment; body usually entirely very dark brown, almost black, occasionally with faint iridescent reflections, femora always partly brown; forewing of male without a patch of dark setae----- *verrucarii* Balduf (p. 565)
52. Body varying from very dark brown to black, and with only very faint iridescent blue or blue-green reflections; submarginal vein of forewing with two dorsal bristles; mesoscutellum often bearing three pairs of bristles; propodeal spiracles round, paraspircular carinae faint, posterior end reaching postspiracular suture, as in fig. 21, *b*; postscutellum smooth.
----- *carpatius*, new species (p. 566)
Not having that combination of characters; propodeum either lacking paraspircular carinae, or these carinae present and posterior end reaching posterior margin of propodeum----- 53
53. Marginal vein of forewing three or more times as long as stigmal vein----- 54
Marginal vein of forewing twice as long as stigmal vein----- 55
54. Surface of propodeum shagreened, paraspircular carinae present, median carina well developed----- *hunteri* Crawford (p. 567)
Surface of propodeum smooth, paraspircular carinae wanting, median carina only vaguely indicated----- *turionum* (Hartig) (p. 568)
55. Metatibiae partly dark brown----- *caerulescens* Ashmead (p. 568)
Metatibiae entirely light yellow or white----- *dolosus* Gahan (p. 570)
56. Setae laterad and ventrad of scrobe cavity set in deep pits; ocellar triangle with large, deep punctures (fig. 17, *c*); a triangular fracture present at ventral margin of each compound eye (this fracture very small in one species)----- 57
Setae on face not set in deep pits; ocellar triangle not with large, deep pits; triangular fracture not present at ventral margin of each compound eye. 60
57. Paraspircular carinae absent, surface of propodeum shining and with very shallow, obscure reticulations; prepectus faintly reticulated.
----- *strobilus*, new species (p. 570)
Paraspircular carinae present, surface of propodeum strongly sculptured; prepectus deeply punctured or strongly reticulated----- 58
58. Rudimentary petiole with dorsal surface smooth, as in fig. 21, *c*; propodeum with shallow reticulate sculpturing----- *sobrius* Gahan (p. 572)
Rudimentary petiole with dorsal surface distinctly sculptured, as in fig. 21, *b*; propodeum closely and deeply punctured----- 59
59. Thorax dark, iridescent blue-green with occasional purplish reflections; median groove of mesopraescutum relatively broad; propodeum with median and paraspircular carinae, fig. 21, *b*----- *punctatifrons* (Girault) (p. 572)
Thorax dark, shining brown or black, noniridescent; median groove of mesopraescutum fine; propodeum with median, paraspircular, and oblique carinae, as in fig. 21, *d*----- *banksii* Howard (p. 573)
60. Apex of hindwing acute, as in fig. 20, *f, h*; fringe at posterior margin one-half or more as wide as wing at hamuli----- 61

- Apex of hindwing blunter, as in fig. 20, *g. i*; fringe at posterior margin one-third or less as wide as wing at hamuli..... 63
61. First funicle segment of antenna, long, slender, more than four times as long as wide, fig. 16, *g*..... *gibboni* (Girault) (p. 574)
- First funicle segment not more than two and one-half times as long as wide..... 62
62. All funicle segments equal in length; surface of mesoscutellum smooth.
polynemae Ashmead (p. 575)
- First funicle segment one and one-half times as long as second (fig. 16, *c*); surface of mesoscutellum with distinct, shallow reticulations.
oecanthivorus compar Gahan (p. 575)
63. Dorsum of thorax bright yellow with iridescent black or bluish-green spots.
venustus Gahan (p. 576)
- Dorsum of thorax not having a combination of yellow and iridescent coloration..... 64
64. Thorax metallic green with the tegulae and a spot on dorsal margin of mesopleuron yellow; bases of hind coxae dark, remainder of hindlegs and other legs entirely, yellow or white..... *xanthops* (Ratzeburg) p. 577
- Not having that combination of colors; thorax either entirely yellow, or brown, black, or iridescent blue-green without a yellow spot on dorsal margin of mesopleuron..... 65
65. Propodeum with paraspiracular carinae, as in fig. 21, *a-d*..... 66
- Propodeum without paraspiracular carinae, as in fig. 21, *e, f*..... 67
66. Metatibiae usually entirely light yellow or white, sometimes slightly darkened, occasionally mostly brown; metapleuron with rather deep, close, scale-like reticulations, the lateral area of propodeum with shallower, more indistinct reticulations (fig. 17, *f*); metacoxae with a distinct, iridescent purple luster; gaster never greatly longer than thorax and propodeum combined, at most one and one-third times as long, the two tagmata often equal in length.
racemariae Ashmead (p. 578)
- Not having that combination of characters; metatibiae always mostly dark brown; metapleuron and lateral area of propodeum both with nearly the same type of sculpture (fig. 17, *g*); metacoxae black.
cormus, new species (p. 579)
67. Mesopraescutum lacking a median, longitudinal groove and bearing one row of bristles at each lateral margin; body black or very dark brown, with very faint bluish or greenish iridescent reflections sometimes visible; tibiae entirely light yellow or white; surface of propodeum almost smooth, its median length one-third as great as length of mesoscutellum; spiracles contiguous with anterior margin of propodeum; gaster only slightly longer than thorax and propodeum combined..... *minutus* (Howard) (p. 530)
- Not having that combination of characters; median longitudinal groove of mesopraescutum usually distinct..... 68
68. Marginal vein of forewing four or more times as long as stigmal vein; body elongate and black, with very faint iridescent bluish or greenish luster... 69
- Not having that combination of characters; marginal vein of forewing never more than three and one-half times as long as stigmal vein, usually less than three times as long..... 70
69. Mesotibiae entirely light yellow or white; marginal vein of forewing four and one-half times as long as stigmal vein... *faustus*, new species (p. 582)
- Mesotibiae partly dark brown; marginal vein four times as long as stigmal.
hibus, new species (p. 582)
70. Body iridescent green, blue, blue-green or somewhat purplish (not visible in teneral specimens); may be very dark brown or black with rather faint

- iridescent green or blue-green sheen, but dorsum of thorax always with a distinct bright-colored sheen, and never dull brown or black or shining, jet black----- 71
- Body yellow, brown or black, noniridescent----- 80
71. First funicle segment elongate, from one and two-fifths to one and one-half times as long as second segment (fig. 16, *d*); mesal length of propodeum one-sixth as great as length of mesoscutellum; antennae inserted slightly dorsad of level of ventral margins of compound eyes; legs distad of coxae almost always entirely light yellow or white, metafemora occasionally darkened on basal half----- *carinatus* Forbes (p. 583)
- Not having that combination of characters----- 72
72. Body bright, iridescent blue-green; frons iridescent purple; apex of scape almost reaching level of vertex; abdomen acute at apex and elongate, almost twice as long as thorax----- *repulsus* Girault (p. 584)
- Face not iridescent purple----- 73
73. Body iridescent blue; gaster equal in length to thorax, and these tagmata equal in width; submarginal vein of forewing with two dorsal bristles; antennae unusually short, the funicle segments becoming progressively broader and shorter toward apex, much as in fig. 16, *f*.
malophilus, new species (p. 585)
- Not having that combination of characters----- 74
74. Spiracles almost or quite contiguous with anterior margin of propodeum, as in fig. 21, *f*----- 75
- Spiracles separated from anterior margin of propodeum by a space at least one-half as great as length of a spiracle, as in fig. 21, *a*, *c*, *e*----- 76
75. Thorax bright, iridescent blue; marginal vein of forewing only slightly more than twice as long as stigmal vein----- *bruchophagi* Gahan (p. 585)
- Thorax brown, with a rather faint blue luster; marginal vein of forewing three and one-half times as long as stigmal vein.
marcovitchi (Crawford) (p. 586)
76. Propodeum long; its mesal length more than one-fourth as great as length of mesoscutellum----- 77
- Propodeum shorter; its mesal length only one-fifth or one-sixth as great as length of mesoscutellum----- 78
77. Body bright, iridescent green or blue-green; anterior tibiae tan or brown, usually slightly darker than middle and hind tibiae; antennal scape mostly black----- *rapo* (Walker) (p. 587)
- Body brown with rather faint green iridescent sheen; all tibiae white or yellow; antennal scape almost entirely light yellowish or white.
microrhopalae Ashmead (p. 588)
78. Body dark, iridescent blue; antennal scape short, its apex not reaching level of anterior ocellus, club longer than two distal funicle segments combined.
chlamytis Ashmead (p. 589)
- Body dark brown or black with rather faint iridescent blue or blue-green sheen; apex of antennal scape reaching level of anterior ocellus, club as long as two distal funicle segments combined----- 79
79. Head and body faintly iridescent blue-green; mesopraescutum with one row of bristles at each lateral margin----- *gerstaeckeriae* Gahan (p. 590)
- Head and body iridescent blue or blue-green with faint purplish cast; mesopraescutum with two rows of bristles at each lateral margin.
rugglesi Rohwer (p. 590)

80. All funicle segments broad and short, and each segment slightly broader and shorter than the segment proximad of it, club broad, subglobose, as in fig. 16, *f*----- 81
 All funicle segments nearly or quite equal in width, and club not conspicuously short----- 82
81. Mesopraescutum with two rows of bristles at each lateral margin; spiracles separated from anterior margin of propodeum by a space one-half as great as length of a spiracle; antennal funicle and club both brown.
thanasimi Ashmead (p. 591)
- Mesopraescutum with one row of bristles at each lateral margin; spiracles contiguous with anterior margin of propodeum; antennal funicle brown, club yellow----- *varicornis* (Girault) (p. 592)
82. Head and body entirely brown or black----- 83
 Head and body partly or entirely yellow; at least area of head around mouth-parts and mesal area of postscutellum yellow----- 87
83. Mesal length of propodeum one-fourth as great as length of mesoscutellum; body broad, short and compact; length of gaster equal to or less than length of thorax; gaster broad, thorax and abdomen appear to be equal in width; mesopraescutum broader than long; body uniformly dull brown or black.
neuroteri (Ashmead) (p. 592)
- Not having that combination of characters----- 84
84. Tibiae partly dark brown or black; first funicle segment one and one-sixth times as long as second segment; body shining black, and antennae entirely black----- *silvaticus* Gahan (p. 593)
 Tibiae usually entirely light yellow or white, occasionally faintly shaded with tan, but never partly dark brown or black----- 85
85. Segments of antennal funicle elongate, first segment one and one-third times as long as second----- *nebraskensis* (Girault) (p. 594)
 Segments of antennal funicle subquadrate, first and second segments equal in length or second slightly longer than first----- 86
86. Gaster elongate, slender; twice as long as thorax-- *rosae* Ashmead (p. 595)
 Gaster subglobose (flattened in dry specimens), only slightly longer than thorax----- *blastophagi* (Ashmead) (p. 595)
87. Spiracular grooves of propodeum almost obliterated, median length of propodeum three-eighths as great as length of mesoscutellum; one stout bristle present laterad of each propodeal spiracle; abdomen subglobose, slightly broader than thorax, and apices of ovipositor sheaths just reaching apex of abdomen----- *lasius*, new name (p. 596)
 Spiracular suture clearly extending from spiracle to posterior margin of propodeum; apices of ovipositor sheaths slightly exceeding apex of abdomen----- 88
88. First funicle segment of antenna one and one-third times as long as second segment----- 89
 First funicle segment as long as or slightly shorter than second segment-- 90
89. Dorsum of thorax mostly yellow, abdomen yellow with transverse brown bands----- *juniperi* (Crawford) (p. 597)
 Dorsum of thorax almost entirely brown; abdomen uniformly brown.
nebraskensis (Girault) (p. 594)
90. Second funicle segment of antenna longer than first; median length of propodeum one-third as great as length of mesoscutellum; body mostly brown, abdomen uniformly brown----- *impexus* Girault (p. 597)
 First and second funicle segments equal in length; median length of propodeum one-fifth as great as length of mesoscutellum; body usually mostly yellow, abdomen with transverse brown bands-- *marylandensis* (Girault) (p. 598)

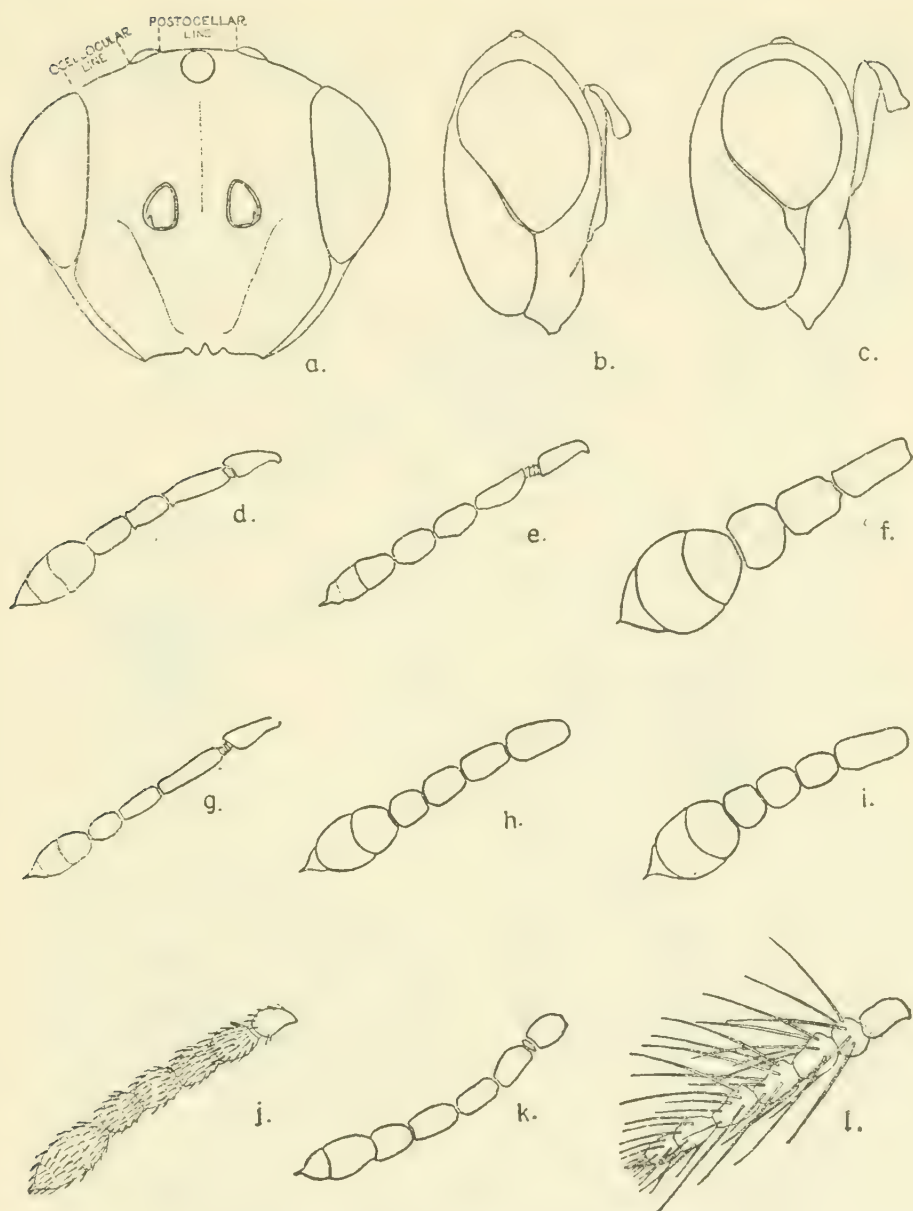


FIGURE 16.—HEAD AND ANTENNAE OF TETRASTICHUS

- a, *T. longicarpus* (Girault): Anterior aspect of head.
 b, *T. spilopteris*, new species: Lateral aspect of head.
 c, *T. pattersonae* Fullaway: Lateral aspect of head.
 d, *T. carinatus* Forbes: Pedicel and flagellum of ♀ antenna.
 e, *T. oecanthivorus compar* Gahan: Pedicel and flagellum of ♀ antenna.
 f, *T. varicornis* (Girault): Pedicel and flagellum of ♀ antenna.
 g, *T. gibboni* (Girault): Pedicel and flagellum of ♀ antenna.
 h, *T. dyrus*, new species: Pedicel and flagellum of ♀ antenna.
 i, *T. triozae*, new species: Pedicel and flagellum of ♀ antenna.
 j, *T. cormus*, new species: Pedicel and flagellum of ♂ antenna.
 k, *T. xanthops* (Ratzeburg): Pedicel and flagellum of ♀ antenna.
 l, *T. triozae*, new species: Pedicel and flagellum of ♂ antenna.

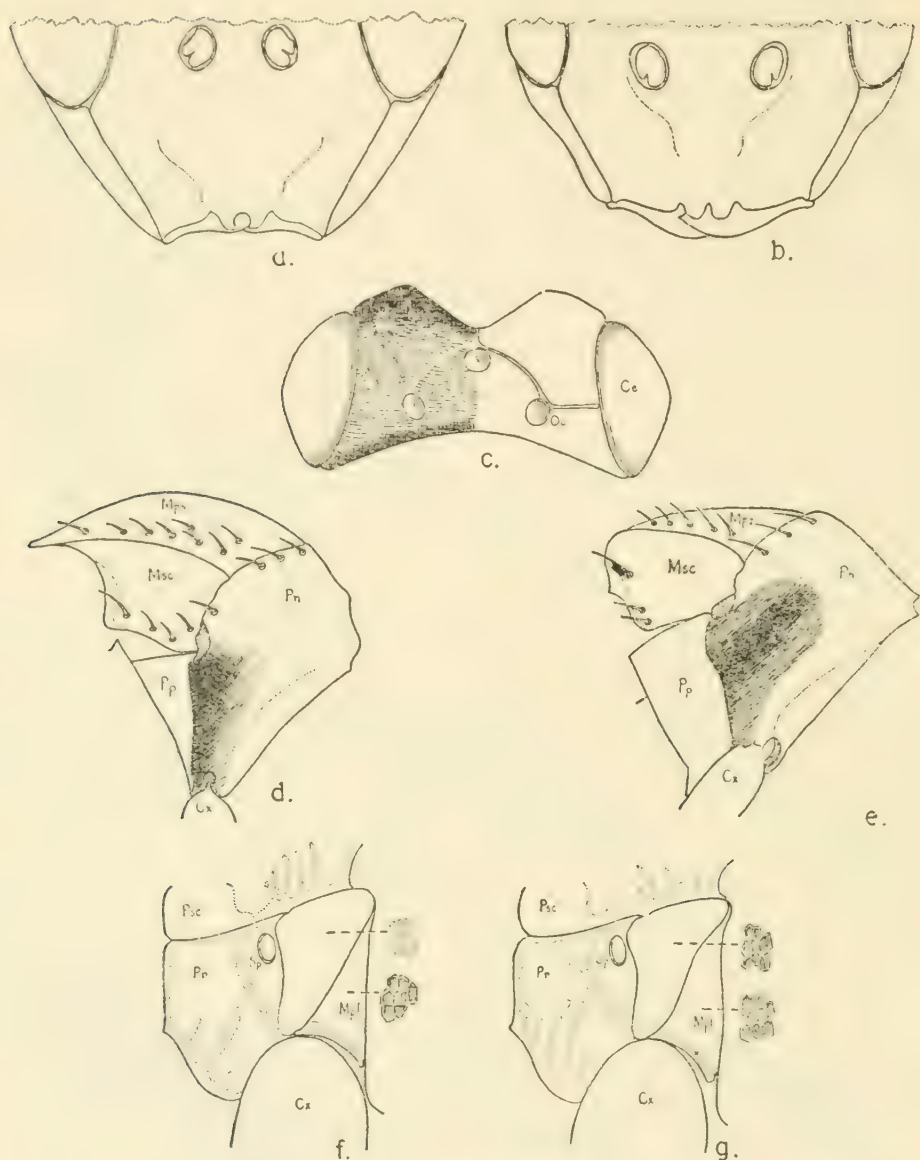


FIGURE 17.—HEAD, THORAX, AND ABDOMINAL STRUCTURES OF TETRASTICHUS

- a*, *T. hylotomae* (Ashmead): Anterior aspect of lower half of head.
b, *T. asparagi* Crawford: Anterior aspect of lower half of head.
c, *T. punctatifrons* (Girault): Dorsal aspect of head. (*Ce*, compound eye; *Oc*, ocellus.)
d, *T. bruchophagi* Gahan: Lateral aspect of prothorax and part of mesothorax. (*Cx*, coxa; *Mps*, mesopraescutum; *Msc*, scapula; *Pn*, pronotum; *Pp*, prepectus.)
e, *T. longicarpus* (Girault): Lateral aspect of prothorax and part of mesothorax.
f, *T. racemariae* Ashmead: Lateral aspect of propodeum and metapleuron. (*Cx*, coxa; *Mpl*, metapleuron; *Pr*, propodeum; *Psc*, postscutellum; *Sp*, spiracle.)
g, *T. cormus*, new species: Lateral aspect of propodeum and metapleuron.

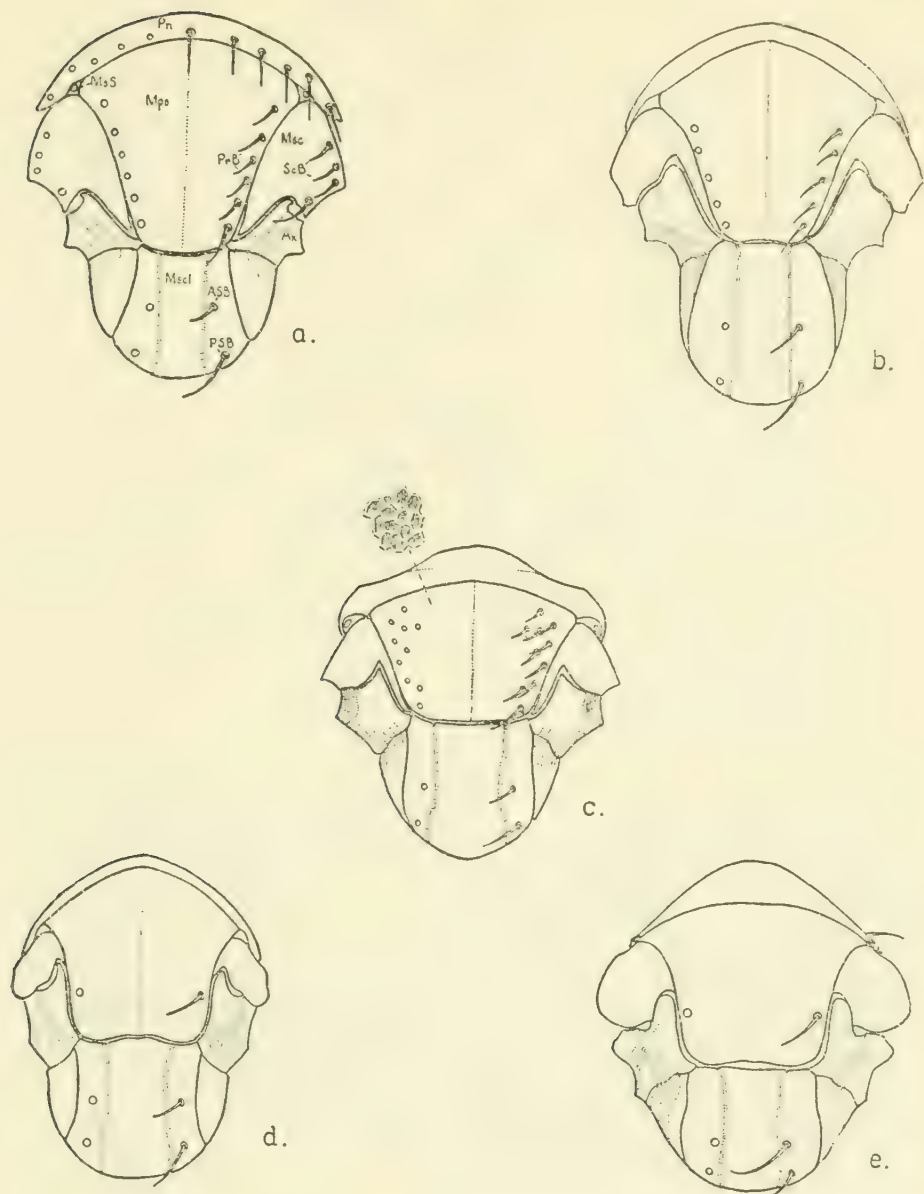


FIGURE 18.—THORAX, DORSAL ASPECT, OF TETRASTICHUS

- a*, Generalized *Tetrastichus* thorax. (*ASB*, anterior scutellar bristle; *Ax*, axilla; *Mps*, mesopraescutum; *Msc*, scapula; *MscI*, mesoscutellum; *MsS*, thoracic spiracle; *Pn*, pronotum; *PrB*, praescutal bristles; *PSB*, posterior scutellar bristle; *ScB*, scapular bristles.)
b, *T. asparagi* Crawford.
c, *T. fumipennis* (Girault).
d, *T. whitmani* (Girault).
e, *T. flora* (Girault).

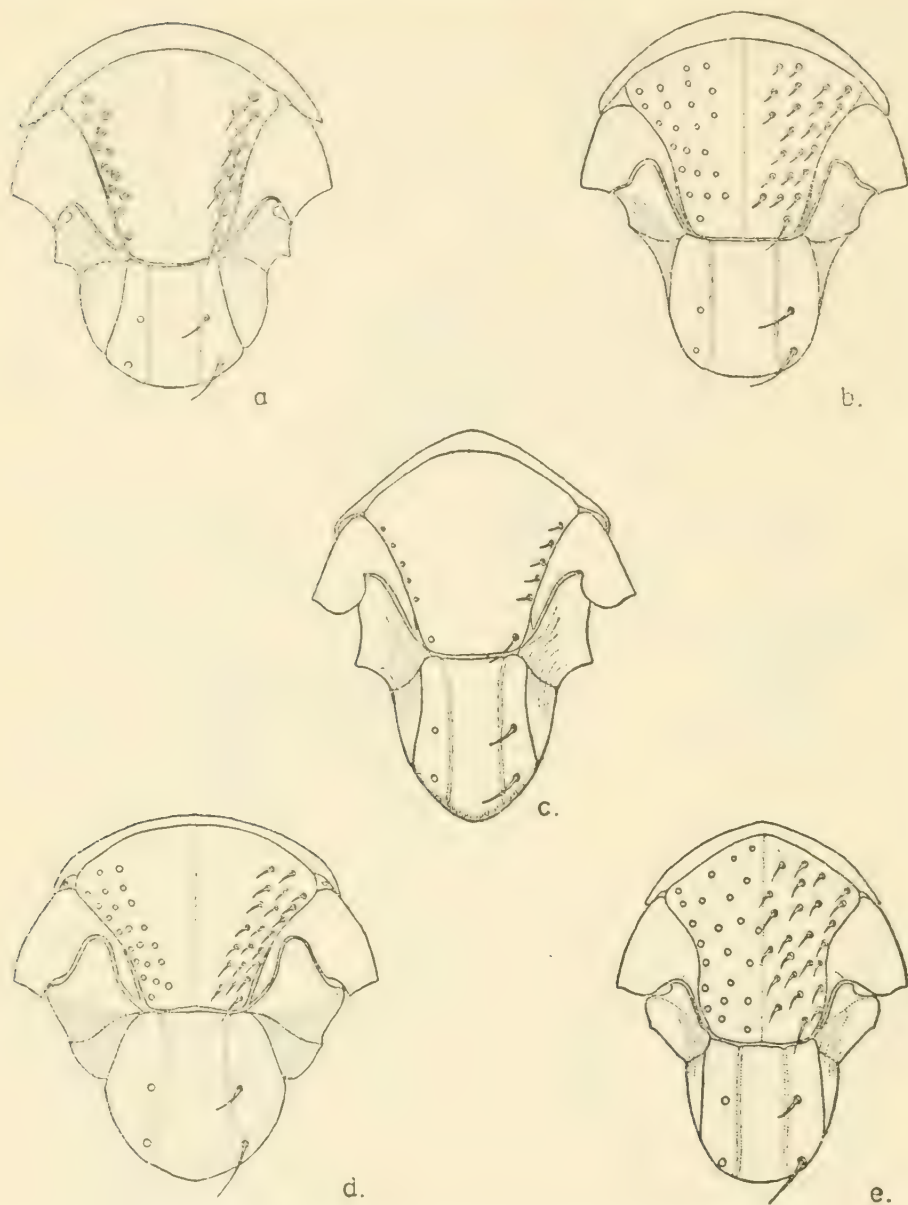


FIGURE 19.—THORAX, DORSAL ASPECT, OF TETRASTICHUS

- a, *T. punctatifrons* (Girault).
b, *T. caerulescens* Ashmead.
c, *T. melanis*, new species.
d, *T. hunteri* Crawford.
e, *T. verrucarii* Balduf.

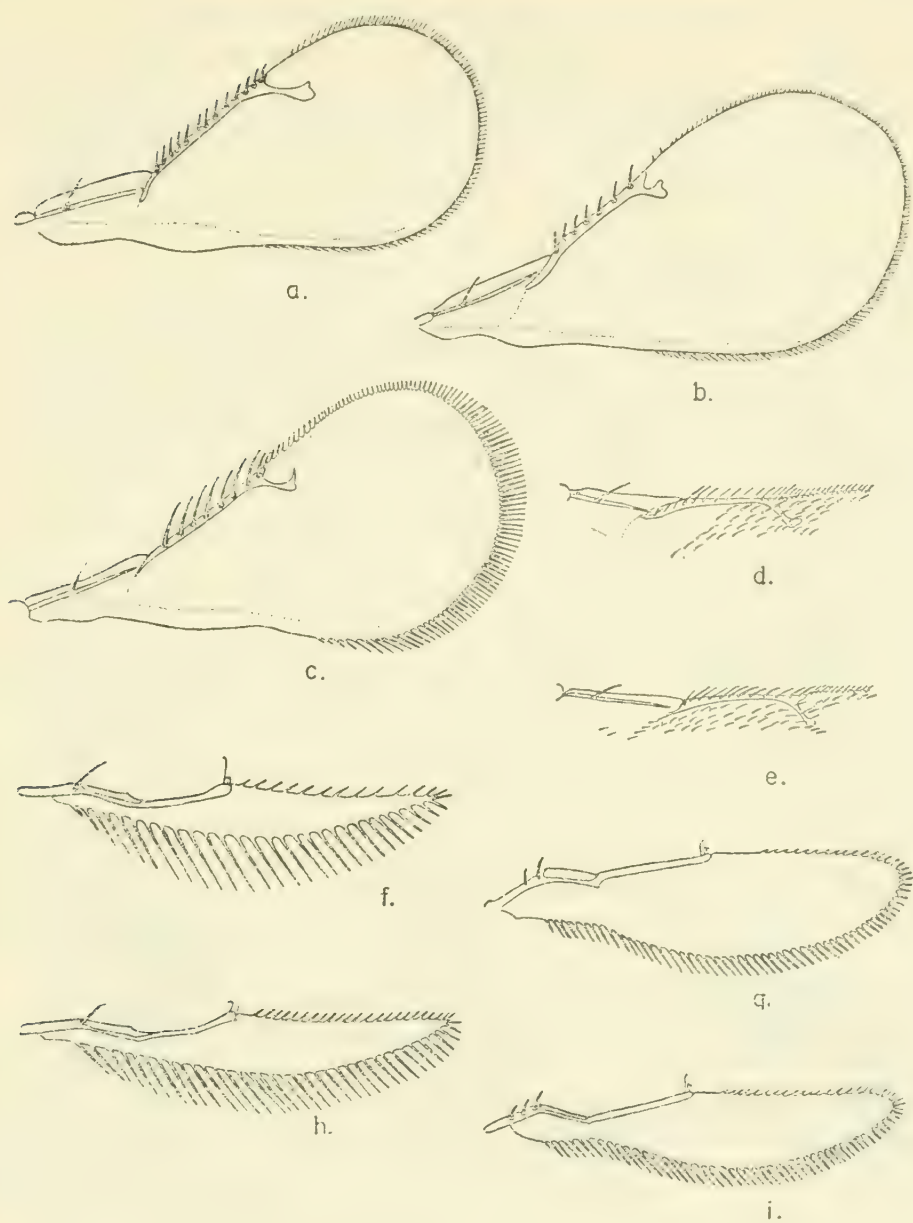


FIGURE 20.—WINGS OF TETRASTICHUS

- a*, *T. johnsoni* Ashmead: Forewing.
b, *T. brevistigma* Gahan: Forewing.
c, *T. ovipransus* Crosby and Leonard: Forewing.
d, *T. triozae*, new species: Anterobasal area of forewing.
e, *T. dyrus*, new species: Anterobasal area of forewing.
f, *T. polynemae* Ashmead: Hindwing.
g, *T. asparagi* Crawford: Hindwing.
h, *T. ainsliei* Gahan: Hindwing.
i, *T. carinatus* Forbes: Hindwing.

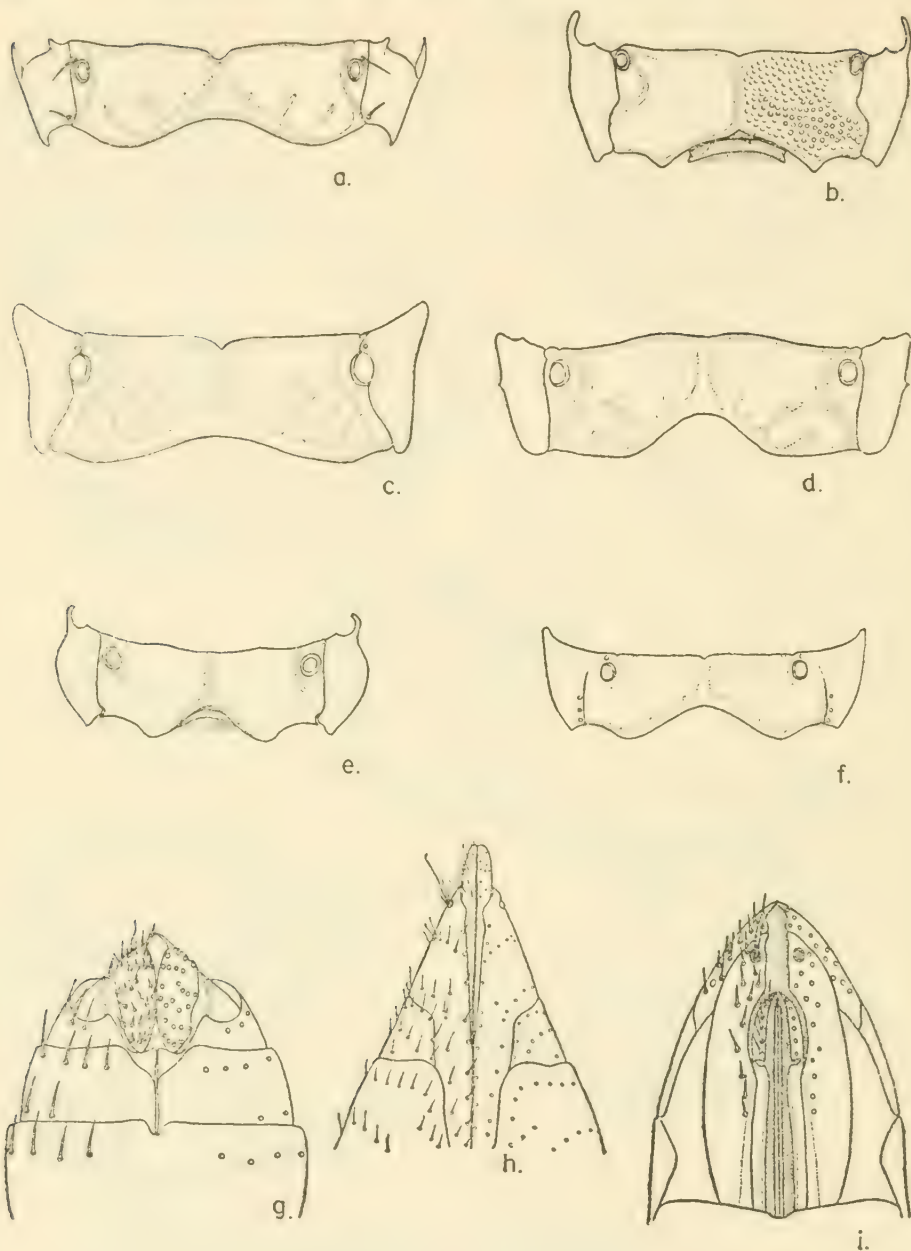


FIGURE 21.—ABDOMINAL STRUCTURES OF TETRASTICHUS

- a, *T. fumipennis* (Girault): Propodeum.
 b, *T. punctatifrons* (Girault): Propodeum.
 c, *T. cormus*, new species: Propodeum.
 d, *T. racemariae* Ashmead: Propodeum.
 e, *T. rapo* (Walker): Propodeum.
 f, *T. bruchophagi* Gahan: Propodeum.
 g, *T. chrysopae* (Crawford): Ventral aspect of apex of ♀ gaster.
 h, *T. cormus*, new species: Ventral aspect of apex of ♀ gaster.
 i, *T. hylotomae* (Ashmead): Ventral aspect of apex of ♀ gaster.

TETRASTICHUS CHRYSOPAE (Crawford), new combination

FIGURE 21, *g*

Geniocerus chrysopae CRAWFORD, Proc. U. S. Nat. Mus., vol. 48, p. 584, 1915.

Tetrastichodes chrysopae (Crawford) GIRAULT, Societas entomologica, vol. 31, p. 35, 1916.

Aprostoceroloides annapolis GIRAULT, Chalcidoidea nova Marilandensis, pt. 2, p. 2, 1917. (New synonymy.)

Black or very dark brown, sometimes faintly iridescent; apices of femora, tibiae usually, and basal three segments of tarsi, white or light yellow; tibiae often more or less brown.

Female.—Length, 1.0–1.2 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not reaching level of anterior ocellus; all funicle segments equal in length; antennal club equal in length to funicle; length of malar space one-half height of compound eye; length of postocellar line twice as great as ocellular. Mesopraescutum slightly wider than long, bearing one row of bristles at each lateral margin; submarginal vein of forewing with two dorsal bristles; hindwing blunt at apex, fringe at posterior margin one-third as wide as wing at hamuli. Surface of propodeum almost smooth, under strong light showing faint reticulations, mesal length of propodeum one-third as great as that of mesoscutellum; median carina of propodeum usually entirely wanting, occasionally faintly indicated, paraspicular carinae wanting; spiracles almost contiguous with anterior margin of propodeum; diameter of spiracles two-thirds as great as mesal length of propodeum; gaster slightly shorter than thorax; ovipositor sheaths flattened and padlike (fig. 21, *g*).

Male.—Length, 1.0 mm. Darkened anterior carina of scape almost as long as scape, first funicle segment three-fifths as long as second, three distal segments equal in length, setae borne by funicle segments slightly shorter than segments themselves; club slightly longer than three apical funicle segments; gaster one-fifth shorter than thorax; apex of ninth tergite acute, as in female.

Type locality.—Batesburg, S. C.

Type.—U.S.N.M. No. 18380.

Hosts.—Pupae of lacewing flies, *Chrysopa rufiflavis* Burmeister, *C. plorabunda* Fitch, *C. oculata* Say.

Distribution.—California, District of Columbia, Florida, Illinois, Maryland, North Carolina, Ohio, South Carolina, Tennessee, Texas; Mexico.

TETRASTICHUS THRIPOPHONUS Waterston

Tetrastichus sp. MASON, Ent. News, vol. 33, p. 199, 1922.

Tetrastichus thripophonus WATERSTON, Bull. Ent. Res., vol. 13, p. 453, 1923.—

TAYLOR, Fiji Legis. Council Paper, No. 14, 5 pp., 1928.—SIMMONDS, Journ.

Agr. Fiji, vol. 3, p. 58, 1930.

Tetrastichus tatei DOZIER, Journ. Agr. Univ. Puerto Rico, vol. 21, p. 129, 1937.
(New synonymy.)

Dull brown, with antennae, area of head around mouthparts, tegulae, entire front and middle femora and apices of hind femora, tibiae, basal segments of tarsi, and base of gaster light yellow or white.

Female.—Length, 1.0–1.1 mm. Antennae inserted at level of ventral margins of compound eyes; margin of ventral tooth of mandible minutely serrulate; apex of antennal scape not quite reaching level of anterior ocellus; pedicel and second and third funicle segments equal in length, first segment slightly shorter than second, club wider than funicle and almost as long as it; postocellar line one and one-half times as long as ocellular; area of frons laterad and dorsad of scrobe cavity with well-marked, transverse reticulations. Mesopraescutum bearing two bristles at each lateral margin; submarginal vein of forewing with two dorsal bristles; apex of hindwing acute, fringe at posterior margin two-thirds as wide as wing at hamuli. Surface of propodeum smooth, median and paraspiracular carinae absent; mesal length of propodeum two and one-third times as great as mesal length of metanotum, and two-thirds as long as mesoscutellum; propodeal spiracles contiguous with anterior margin; gaster narrow, blunt at apex, and as long as thorax; apex of ovipositor sheaths not quite reaching apex of abdomen, sheaths enlarged, and bearing only four or five bristles.

Male.—Unknown.

Type locality.—Trinidad, British West Indies.

Type.—One female specimen in the British Museum.

Hosts.—Prepupae of thrips, *Liothrips laurcli* (Mason), *Liothrips urichi* Karny, *Gynaikothrips uzeli* (Zimmerman).

Distribution.—Florida; Puerto Rico; Trinidad, British West Indies; Fiji.

Remarks.—Waterston's excellent description makes it possible to identify with certainty this distinctive species without examining the type.

TETRASTICHUS JOHNSONI Ashmead

FIGURE 20, *a*

Tetrastichus johnsoni ASHMEAD, Trans. Amer. Ent. Soc., vol. 23, p. 233, 1896.—FRISON, Bull. Illinois Nat. Hist. Surv., vol. 16, p. 223, 1927.

Apastocetus johnsoni (Ashmead) GIRault, Societas Entomologica, vol. 31, p. 35, 1916.

Very dark brown or black, noniridescent; scape and pedicel, apices of coxae, trochanters, bases and apices of femora, tibiae, and basal three segments of tarsi light yellow or white.

Female.—Length, 1.1–1.2 mm. Antennae inserted at level of ventral

margins of compound eyes; apex of scape reaching level of ventral margin of anterior ocellus; pedicel three-quarters as long as first funicle segment, all funicle segments subequal in length, first slightly shorter than second; club as long as two distal funicle segments; length of malar space one-half as great as height of compound eye; postocellar line one and one-half times as long as ocellocular line. Mesopraescutum wider than long and bearing three or four long bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle: apex of hindwing blunt, fringe at posterior margin one-third as wide as wing at hamuli. Surface of propodeum strongly reticulated, paraspiracular carinae present; mesal length of propodeum one-half as great as length of mesoscutellum; propodeal spiracles almost touching anterior margin; gaster rounded, short, equal in length to thorax; apices of ovipositor sheaths just reaching apex of abdomen, occasionally not quite reaching apex.

Male.—Length, 0.6–0.9 mm. Pedicel and first funicle segment of antenna equal in length, three distal segments of funicle equal in length and each one-eighth longer than first, funicle segments slightly enlarged near bases, bearing long setae, as in figure 16, *l*; gaster as long as thorax.

Type locality.—Urbana, Ill.

Types.—U. S. N. M. No. 385; paratypes in Illinois State Natural History Survey Collection.

Host.—Reared from the nest of a spider wasp, *Phanagenia bombycina* (Cresson), but may not be a primary parasite of it.

Distribution.—Illinois.

TETRASTICHUS LISSUS, new species

Thorax black, with iridescent blue luster; head and gaster very dark brown or black, with very faint iridescence; antennal scape, bases and apices of femora, tibiae, and basal three segments of tarsi light yellow or white; flagellum of antenna and apical segment of tarsi tan.

Female.—Length, 1.6–1.7 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; apex of scape not reaching level of anterior ocellus; pedicel one and one-half times as long as first funicle segment, all three funicle segments of equal length and each almost as wide as long, club as long as funicle; height of compound eye only one and one-quarter times as great as length of malar space; postocellar line one and one-half times as long as ocellocular. Mesopraescutum with two or three rather irregular rows of bristles at each lateral margin; longitudinal grooves of mesoscutellum obliterated at anterior margin; submarginal vein of forewing with four or five dorsal bristles, marginal vein short, less than twice as long as stigmal vein; apex of hindwing blunt, fringe at posterior

margin one-fifth as wide as wing at hamuli. Surface of propodeum slightly reticulated, almost smooth, obscure median, paraspiracular and oblique carinae present; spiracles round, almost touching anterior margin of propodeum; median length of propodeum one-third as great as length of mesoscutellum; gaster broad, blunt at apex, slightly shorter than thorax; apices of ovipositor sheaths not reaching apex of abdomen.

Male.—Unknown.

Type locality.—Snowflake, Ariz.

Types.—U.S.N.M. No. 56236.

Described from 4 female specimens, one of which is the holotype, reared June 10, 1932, from the pods of locoweed (*Astragalus mollissimus*) by E. E. Russell, under Tempe No. 6882.

TETRASTICHUS ICHTHYUS, new species

Head and thorax with relatively large and intense reticulate sculpturing, and with blue, blue-green, or purplish iridescence, frons strikingly iridescent purple; gaster, coxae, trochanters, and most of femora very dark brown; area of head around mouthparts, pedicel and flagellum of antenna usually, and apical segment of tarsi tan; scape, bases and apices of femora, tibiae, and basal three segments of tarsi light yellow or white; entire antenna may be yellow.

Female.—Length, 1.5–1.7 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not reaching level of anterior ocellus; pedicel slightly longer than first funicle segment, first and second segments equal in length, third slightly shorter, club as long as first and second funicle segments combined; length of malar space two-thirds as great as height of compound eye; postocellar line twice as long as ocellocular. Mesopraescutum with two or three rather irregular rows of bristles at each lateral margin; submarginal vein of forewing with three or four dorsal bristles, marginal vein two and one-half times as long as stigmal; apex of hindwing blunt, fringe at posterior margin one-fifth as wide as wing at hamuli. Surface of propodeum shagreened, and with strong median, paraspiracular, and oblique carinae, as in figure 21, *d*; median length of propodeum one-third as great as length of mesoscutellum; spiracles almost touching anterior margin of propodeum; gaster broad and slightly shorter than thorax; apices of ovipositor sheaths not quite reaching apex of abdomen.

Male.—Length, 1.4 mm. Darkened anterior carina of scape two-thirds as long as scape, pedicel slightly longer than first funicle segment, all four funicle segments of equal length, semiquadrate and without long bristles, club slightly more than twice as long as a funicle

segment; marginal vein twice as long as stigmal vein; gaster two-thirds to four-fifths as long as thorax.

Type locality.—Idlewild, Tex.

Types.—U.S.N.M. No. 56259.

Described from the female holotype, male allotype, and 1 male and 12 female paratypes reared January 8–April 9, 1891, from small globose leaf galls on live oak, under Bureau of Entomology No. 4841⁶⁵. The host is probably *Dryophanta emoryi* Ashmead. The galls were sent in to the Bureau by L. Biediger. Seven additional specimens of this species, not included in the type series, were possibly reared from the gall of *Neuroterus rileyi* (Bassett). These latter specimens are from some unknown locality.

TETRASTICHUS MELANIS, new species

FIGURE 19. c

Shining black; mouthparts, bases and apices of femora and tibiae, and basal segments of tarsi yellow or brown; teneral specimens dark brown instead of black.

Female.—Length, 1.3–1.9 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus; all funicle segments slightly longer than broad, and equal in length, club slightly longer than two funicle segments; length of malar space two-thirds to three-quarters height of compound eye; postocellar line one and one-half times as long as ocellular. Mesopraescutum as wide as long (fig. 19, c) and bearing one row of bristles at each lateral margin, median furrow absent; submarginal vein of forewing bearing one dorsal bristle; apex of hindwing blunt, fringe at posterior margin one-fourth as wide as wing at hamuli; scutellum sometimes with three pairs of bristles, anterior pair located close to anterior margin. Propodeum shagreened; paraspiracular carinae present; mesal length of propodeum one-third length of mesoscutellum; propodeal spiracles large, close to but not quite touching anterior margin; gaster as long as thorax; ovipositor sheaths not reaching apex of abdomen.

Male.—Length, 1.3–1.4 mm. Darkened anterior carina of scape two-thirds as long as scape, second funicle segment one-fifth longer than first, third and fourth equal in length and each one-half longer than first, club as long as two apical funicle segments; funicle segments bearing bristles approximately as long as segments; gaster slightly longer than thorax; apex of ninth tergite acute, as in female.

Type locality.—Wenatchee, Wash.

Types.—U.S.N.M. No. 56237.

Described from 36 female and 7 male specimens as follows: Female holotype, male allotype, and 13 female and 2 male paratypes, reared

from the pupa of *Coccinella 5-notata* Kirby, August 1, 1915 (Quaintance No. 11467), by E. J. Newcomer; 1 male and 11 female paratypes, (Queiph, Ontario, reared from a coccinellid predaceous on a turnip aphid, August 20, 1934, W. E. Heming; and 11 female and 3 male paratypes, Cambridge, Mass., reared from *Coccinella* sp.

TETRASTICHUS BREVISTIGMA Gahan

FIGURE 19, b

Tetrastichus brevistigma GAHAN, Proc. Ent. Soc. Washington, vol. 33, p. 76, 1936.—BERRY, U. S. Dept. Agr. Circ. 485, 1938.

Body shining black; head, antennae, middle parts of middle and hind femora, and apical segments of tarsi brown; coxae black at base, yellow or white at apex; rest of legs yellow; abdomen slightly lighter at base.

Female.—Length, 1.0–1.5 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of vertex; first funicle segment slightly longer than second, second and third equal in length; club slightly shorter than three funicle segments; length of malar space three-fourths as great as height of compound eye; postocellar line twice as long as ocellular. One row of bristles present at each lateral margin of mesopraescutum; submarginal vein of forewing with one dorsal bristle; stigmal vein at most one-sixth as long as marginal; hindwing acute at apex, fringe at posterior margin one-third as wide as wing at hamuli. Propodeum very faintly shagreened; mesal length of propodeum slightly less than one-third length of mesoscutellum; median carina of propodeum vague, no paraspiracular carinae present; spiracles touching anterior margin of propodeum; gaster and thorax equal in length; apices of ovipositor sheaths not quite reaching apex of abdomen.

Male.—Length, 0.8 mm. All four funicle segments equal in length and bearing setae only slightly longer than segments; club equal in length to three funicle segments.

Type locality.—Middleboro, Mass.

Types.—U.S.N.M. No. 51446.

Host.—Pupa of the elm leaf beetle, *Galerucella xanthomelaena* (Schrank).

Distribution.—Connecticut, District of Columbia, Massachusetts, New Hampshire, New York, Ohio. It has also been introduced into California.

TETRASTICHUS PANDORA, new species

Brown, or black, with very faint iridescent blue or lavender luster; area of head around mouthparts, antennae, and all of legs except bases of coxae light yellow or white; apical segment of tarsi and sometimes

antennal flagellum slightly darkened. Male may have thorax largely yellow and abdomen yellow at base, with legs entirely yellow.

Female.—Length, 1.4–1.6 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; apex of scape not reaching level of anterior ocellus; pedicel globular, and slightly narrower and shorter than first funicle segment, all three funicle segments equal in length, club slightly more than twice as long as a funicle segment; length of malar space one-half as great as height of compound eye; postocellar line twice as long as ocellocular line. Mesopraesutum with one row of bristles at each lateral margin; submarginal vein of forewing with from four to six dorsal bristles, marginal vein three times as long as stigmal; apex of hindwing blunt, fringe at posterior margin almost one-fourth as wide as wing at hamuli. Surface of propodeum smooth, paraspiracular carinae wanting; spiracles contiguous with anterior margin of propodeum; median length of propodeum almost one-fourth as great as length of mesoscutellum; gaster broad, varying from as long as to one-fifth longer than thorax; apices of ovipositor sheaths not quite reaching apex of abdomen.

Male.—Length, 1.1–1.8 mm. Scape greatly enlarged, darkened anterior carina extending almost entire length of scape, pedicel small, beadlike, slightly longer than first funicle segment but narrower than it, second funicle segment one and one-half times as long as first, three apical segments equal in length, club slightly more than twice as long as fourth funicle segment; length of malar space three-fifths as great as height of compound eye; median length of propodeum one-third as great as length of mesoscutellum; gaster varying from one and one-tenth to one and one-quarter times as long as thorax.

Type locality.—Williamson River, Oreg.

Types.—U.S.N.M. No. 56238.

Described from the female holotype, male allotype, and 35 female and 15 male paratypes, reared from eggs of *Coloradia pandora* Blake, on *Pinus ponderosa*, June 24–July 28, 1924, by J. E. Patterson, under Hopkins U. S. No. 16247–C.

TETRASTICHUS HYLOTOMAE (Ashmead)

FIGURES 17, *a*; 21, *i*

Hyperteles hylotomae ASHMEAD, Can. Ent., vol. 20, p. 105, 1888.

Tetrastichus hylotomae (Ashmead) SCHWARZ, Proc. Ent. Soc. Washington, vol. 11, p. 107, 1909.

Iridescent green; antennae, mouthparts, trochanters, apices of femora, tibiae, and tarsi white or light yellow; male antennae sometimes entirely brown; female gaster often reddish brown, sometimes lighter at base.

Female.—Length, 2.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of antennal scape reaching, or

slightly exceeding, level of vertex; scape almost three times as long as pedicel, second funicle segment slightly longer than first or third, club as long as scape; length of malar space two-thirds as great as height of compound eye; postocellar line slightly less than twice as long as ocellular. Pronotum with a slight femoral groove, much as in figure 17, *c*; one row of bristles present at each lateral margin of mesopraescutum, this sclerite one-fifth wider than long; submarginal vein of forewing bearing one dorsal bristle; hindwing blunt at apex, width of fringe at posterior margin one-sixth as great as width of wing at hamuli. Propodeum strongly shagreened, its mesal length one-third as great as length of mesoscutellum, both median and paraspicular carinae present; spiracles almost touching anterior margin of propodeum; gaster and thorax equal in length; gaster flattened at apex, cerci and spiracles of eighth segment ventral, rather than lateral or dorsal in position, apex of ovipositor sheaths not reaching apex of abdomen (fig. 21, *i*).

Male.—Length, 1.6 mm. First funicle segment slightly longer than pedicel, and shorter than second segment, third and fourth segments equal in length and each one-fourth longer than second; gaster slightly shorter than thorax. The male is extremely rare.

Type locality.—Southeastern Canada.

Types.—U.S.N.M. No. 11982.

Hosts.—Larvae of sawflies, *Arge dulciaria* (Say), *A. pectoralis* (Leach), (?) *Neodiprion* sp.

Distribution.—Illinois, Kentucky, Maryland, Maine, Manitoba, New Brunswick, Ontario, Quebec, Rhode Island, Virginia, West Virginia.

Remarks.—This species is evidently quite closely related to the European species, *T. atrocroculeus* (Nees), which also parasitizes *Arge* larvae.

TETRASTICHUS ASPARAGI Crawford

FIGURES 17, *b*; 18, *b*; 20, *g*

Tetrastichus asparagi CRAWFORD, Proc. Ent. Soc. Washington, vol. 11, p. 150, 1909.—FERNALD, Rep. State Ent. Massachusetts, No. 22 (2), p. 73, 1910.—HOWARD, Journ. Econ. Ent., vol. 3, p. 258, 1910.—RUSSELL and JOHNSTON, Journ. Econ. Ent., vol. 5, p. 429, 1912.—JOHNSTON, Journ. Agr. Res., vol. 4, p. 303, 1915.—ROSS, Agr. Gaz. Canada, vol. 2, p. 1055, 1915; Ann. Rep. Ent. Soc. Ontario No. 46, p. 23, 1916.—GIRAULT, Proc. U. S. Nat. Mus., vol. 51, p. 128, 1916.—HEWITT, Canada Dept. Agr. Dominion Ent. Rep., 1917, p. 56.—CHITTENDEN, U. S. Dept. Agr. Farmers' Bull. 837, p. 8, 1917.—PAILOT, Ann. Epiphyt., vol. 4, p. 335, 1917.—ROSS and CAESAR, Ann. Rep. Ent. Soc. Ontario, No. 50, p. 101, 1920.—BRITTON, Connecticut State Agr. Exp. Stat. Bull. 234, p. 174, 1922.—CHITTENDEN, Oregon Board Hort. Bienn. Rep. No. 17, p. 187, 1923.—FELT, Rep. State Ent. New York, No. 35, p. 92, 1923.—LEONARD, New York (Cornell) Agr. Exp. Stat. Mem. 101, p. 984, 1928.—DRAKE, Iowa Agr. Exp. Stat. Circ. 134, p. 5, 1932.—BEAULNE, Quebec Soc. Protect. Plants Ann. Rep., 1935, p. 59.—BURKS, Ann. Ent. Soc. Amer., vol. 31, p. 159, 1938.

Iridescent blue-green; sometimes scape and pedicel of antennae, anterior trochanters usually, apices of femora, tibiae, and basal segments of tarsi white or light yellow; abdomen slightly lighter at base.

Female.—Length, 1.8–2.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of vertex; all funicle segments equal in length and each slightly longer than pedicel; club as long as two funicle segments; malar space two-thirds height of compound eye; postocellar line one and one-third times as long as ocellocular. Mesopraescutum wider than long and bearing one row of bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle; marginal vein three times as long as stigmal; apex of hindwing blunt, width of fringe at posterior margin one-sixth width of wing at hamuli. Surface of propodeum shagreened, lateral carinae present; median length of propodeum one-half length of mesoscutellum; spiracles not quite touching anterior margin of propodeum; gaster as long as thorax, apices of sheaths not reaching apex of abdomen.

Male.—Unknown and probably does not exist; this species has been reared many times and has always been found to be parthenogenetic.

Type locality.—Amherst, Mass.

Types.—U.S.N.M. No. 12676.

Host.—The asparagus beetle, *Crioceris asparagi* (Linnaeus).

Distribution.—Commonly distributed in eastern and central United States and Canada, wherever asparagus is grown. Occurs also in Europe.

TETRASTICHUS FLORA (Girault), new combination

FIGURE 18, *c*

Aprostocetus flora GIRAULT, New chalcid flies, p. 3, 1917.

Epitetrastichus tricolor GIRAULT, Descriptiones stellarum novarum, p. 9, 1917
[not *Tetrastichus tricolor* Ashmead] (New synonymy.)

Varying from yellow and brown to almost entirely black; antennae usually, head, except areas surrounding ocelli and on occiput, venter of thorax, metacoxae, and basal half to two-thirds of abdomen yellow; femora, tibiae, and tarsi white; male mostly brown.

Female.—Length, 1.25–1.4 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape flattened, reaching level of anterior ocellus, first funicle segment three-quarters as long as pedicel, all funicle segments equal in length, club one and one-half times as long as pedicel; length of malar space two-thirds height of compound eye; postocellar line equal in length to ocellocular. Each lateral angle of pronotum produced in a minute point (fig. 18, *c*); mesopraescutum as wide as long and bearing one pair of bristles,

median carina vague or wanting; submarginal vein of forewing with one dorsal bristle, hindwing acute at apex, fringe at posterior margin one-half width of wing at hamuli; anterior scutellar bristles longer than posterior ones. Surface of propodeum almost smooth, mesal length one-half length of mesoscutellum; median carina only present; spiracles contiguous with anterior margin; gaster usually short, broad, shorter than thorax, although sometimes slightly elongate.

Male.—Length, 1.2 mm. Scape broadened from near base to apex, with darkened anterior carina extending almost entire length of scape; first funicle segment three-fourths as long as pedicel, second segment equal to pedicel, third and fourth equal and each one-eighth longer than second; club slightly longer than three distal funicle segments; gaster shorter than thorax.

Type locality.—Jacksonville, Fla.

Types.—U.S.N.M. No. 21017.

Host.—The boxwood leaf miner, *Monorthropalpus buxi* (Laboulbène).

Distribution.—District of Columbia, Florida, Maryland, Tennessee.

TETRASTICHUS HILLMEADIA (Girault), new combination

Ootetrastichus hillmeadia GIRAULT, Chalcidoidea nova Marilandensis, pt. 3, p. 2, 1917.

Thorax iridescent blue-green; legs white; base of abdomen white, distal part brown and slightly iridescent.

The single available specimen of this species is in such poor condition that the character given here may be shown, when additional material is available, to be partly or wholly incorrect.

Female.—Length, approximately 1.0 mm. First funicle segment narrower than second, but slightly longer, second and third segments equal in length, club twice as long as pedicel; length of malar space one-half as great as height of compound eye; pronotum with an indistinct femoral groove; only one bristle at each lateral margin of mesopraescutum; submarginal vein of forewing apparently with one dorsal bristle; hindwing acute at apex; surface of propodeum smooth, median carina present, paraspiracular carinae absent; gaster one and one-half times as long as thorax.

Male.—Unknown.

Type locality.—Glenn Dale, Md.

Type.—U.S.N.M. No. 21540. (Specimen in very poor condition.)

Host.—Unknown.

Distribution.—Maryland.

TETRASTICHUS SOLIDAGINIS, new species

Head, thoracic pleura and sternum, and gaster dull brown; dorsum of thorax and propodeum shining black; antennal pedicel and fla-

gellum, bases of coxae, and apical segment of each tarsus brown, all other parts of legs and antennal scape light yellow.

Female.—Length, 1.6–1.8 mm. Antennae inserted at level of ventral margins of compound eyes and almost in center of frons; apex of scape slightly exceeding level of vertex; pedicel two-thirds as long as first funicle segment, second segment one-sixth longer than first, third equal to first, club twice as long as third funicle segment; length of malar space four-fifths as great as height of compound eye; ocellocular line one and one-half times as long as postocellar. Mesopraescutum as long as wide and bearing one bristle at each lateral margin; submarginal vein of forewing with one dorsal bristle; apex of hindwing acute, fringe at posterior margin one-half as wide as wing at hamuli. Surface of propodeum shagreened, paraspircular carinae present; mesal length of propodeum one and one-half times as long as metanotum and one-third as long as mesoscutellum; spiracles separated from anterior margin of propodeum by a space one-half as great as length of a spiracle; gaster broad near base, acute at apex (flattened in dry specimens), longer than thorax.

Male.—Length, 1.3 mm. Funicle segments bearing conspicuously long setae on enlargements near bases; pedicel and first funicle segment equal in length, second segment one-third longer than first, third slightly longer than second, fourth equal to second; club as long as third and fourth segments combined; gaster equal to thorax in length.

Type locality.—Probably Utah.

Types.—U.S.N.M. No. 56239.

Described from five female and two male specimens; holotype female, allotype male, and four female and one male paratypes, said to have been reared from goldenrod gall made by *Eurosta solidaginis* (Fitch), under Bureau of Entomology No. 2493⁰³, by H. K. Morrison.

Remarks.—This species probably is not a primary parasite of *Eurosta solidaginis*.

TETRASTICHUS PULCHRIVENTRIS (Girault), new combination

Necomphaloidella pulchriventris GIRAULT, Can. Ent., vol. 48, p. 101, 1916.

Head and thorax very dark brown, almost black, faintly iridescent under strong light; gaster almost entirely white, brown at dorsolateral margins; legs, except bases of coxae, light yellow or white; middle femora partly brown.

Female.—Length, 1.5 mm. Pedicel two-thirds as long as first funicle segment, all funicle segments equal in length; club slightly shorter than second and third funicle segments combined. Mesopraescutum wider than long and bearing a single pair of bristles; submarginal vein of forewing with one dorsal bristle; apex of hind-

wing acute, fringe at posterior margin almost as wide as wing at hamuli. Mesoscutellum two and one-half times as long as propodeum at meson, and mesal lengths of metanotum and propodeum equal; surface of propodeum slightly shagreened, paraspiracular carinae present; propodeal spiracles nearly touching anterior margin; gaster one and three-fourth times as long as thorax.

Male.—Unknown.

Type locality.—Glenn Dale, Md.

Types.—U.S.N.M. No. 19915.

Host.—Unknown.

Distribution.—Maryland.

Remarks.—This species is known only from the unique type; additional material will very likely show variation in the color of the legs and abdomen.

TETRASTICHUS ULYSSES (Girault)

Aprostocetus ulysses GIRAULT, Bull. Brooklyn Ent. Soc., vol. 11, p. 112, 1916.

Head and thorax dark brown, almost black, faintly iridescent under strong light, abdomen almost entirely white, brown at dorso-lateral margins; legs, except bases of coxae, white.

Female.—Length, 1.2 mm. Pedicel equal in length to first funicle segment, second slightly longer than first, club slightly longer than second and third funicle segments combined. Mesopraescutum one and one-half times as wide as long and bearing one bristle at each lateral margin; submarginal vein of forewing with one dorsal bristle; apex of hindwing acute, fringe at posterior margin almost as wide as wing at hamuli. Mesal length of propodeum two-fifths length of mesoscutellum, mesal length of propodeum and metanotum equal; surface of propodeum faintly shagreened, paraspiracular carinae present; propodeal spiracles almost touching anterior margin; gaster one and one-half times as long as thorax.

Male.—Unknown.

Type locality.—Glenn Dale, Md.

Types.—U.S.N.M. No. 20445. (Specimens distorted and broken.)

Host.—Unknown.

Distribution.—Maryland.

Remarks.—This species is known only from the two type specimens, and these specimens are in such poor condition that positive assignment of this specific name is difficult. More material might show this species to be the same as *ainsliei* Gahan.

TETRASTICHUS SEMILONGIFASCIATUS (Girault), new combination

Neomphaloidella semilongifasciatus GIRAULT, Societas Entomologica, vol. 31, p. 35, 1916.

Head and thorax shining black; gaster almost entirely white, brown at dorsolateral margins; bases of coxae, anterior and middle femora partly, and apical segment of each tarsus brown, other parts of legs white.

Female.—Length, 1.8 mm. Pedicel two-thirds as long as first funicle segment; second one-third longer than first, third slightly longer than first, club as long as first and second segments combined. Mesopraescutum two-thirds as long as wide and bearing one bristle at each lateral margin; submarginal vein of forewing with one dorsal bristle; apex of hindwing acute, fringe at posterior margin almost as wide as wing at hamuli. Mesal length of propodeum two-fifths as great as length of mesoscutellum, mesal length of propodeum greater than mesal length of metanotum; propodeum shagreened, paraspiracular carinae present, propodeal spiracles not quite touching anterior margin; gaster more than twice as long as thorax.

Male.—Unknown.

Type locality.—Glenn Dale, Md.

Type.—U.S.N.M. No. 19990.

Host.—Unknown.

Distribution.—District of Columbia, Maryland.

TETRASTICHUS AINSLIEI Gahan

FIGURE 20, h

Tetrastichus ainsliei GAHAN, Proc. U. S. Nat. Mus., vol. 53, p. 214, 1917; U. S. Dept. Agr. Misc. Publ. 174, p. 144, 1933.

Neomphaloidella mediogutta GIRAULT, Ent. News, vol. 28, p. 255, 1917. (New synonymy.)

Head and thorax very dark brown or black; antennae, legs (except bases of coxae), and base of abdomen white; apex of abdomen and darkened parts of legs brown, abdomen sometimes almost entirely white.

Female.—Length, 1.2–1.5 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; apex of scape reaching level of vertex, second funicle segment slightly longer than first, club as long as two apical funicle segments combined; length of malar space three-fifths height of compound eye. Only one pair of praescutal bristles present; mesopraescutum wider than long; submarginal vein of forewing with one dorsal bristle; hindwing acute at apex, fringe at posterior margin one-half width of wing at hamuli. Surface of propodeum shagreened; mesal length of propodeum one-third maximum length of mesoscutellum; both median and paraspiracular carinae present on propodeum; propodeal spiracles near to but not quite touching anterior margin; gaster from one and one-quarter to one and one-half times as long as thorax.

Male.—Length, 1.1–1.2 mm. First funicle segment one-fifth longer than pedicel, second, third, and fourth equal in length and each one-fifth longer than first, funicle segments enlarged near bases and bearing setae twice as long as segments, as in figure 16, 7; club as long as two apical funicle segments; gaster equal in length to thorax.

Type locality.—Elk Point, S. Dak.

Types.—U.S.N.M. No. 20394.

Hosts.—Larvae of *Mordellistena pustulata* Melsheimer, *Mordellistena* sp., *Cylindrocopturus adpersus* (LeConte), and, rarely, the Hessian fly, *Phytophaga destructor* (Say).

Distribution.—Illinois, Iowa, Kansas, Maryland, New York, North Dakota, South Dakota, Virginia.

TETRASTICHUS WHITMANI (Girault), new combination

FIGURE 18, d

Aprostocetus whitmani GIRAULT, Ann. Ent. Soc. Amer., vol. 9, p. 296, 1916.

Aprostocetus marilandicus GIRAULT, Ent. News, vol. 28, p. 21, 1917. (New synonymy.)

Head and thorax black, noniridescent; apex of abdomen and darkened parts of legs, brown; apices of coxae, bases and apices of fore and middle femora, hind femora, all tibiae, basal segments of tarsi, and base of gaster light yellow or white.

Female.—Length, 2.0 mm. All funicle segments subequal in length; apex of scape reaching level of dorsal margin of anterior ocellus; length of malar space one-half height of compound eye. Mesopraescutum with one bristle at each lateral margin; submarginal vein of forewing with one dorsal bristle; apex of hindwing acute. Surface of propodeum shagreened; paraspiracular carinae present; mesal length of propodeum one-sixth length of mesoscutellum; gaster one and three-quarters times as long as thorax.

Male.—Length, 1.8 mm. First and second funicle segments equal and each slightly shorter than third segment, third and fourth equal, funicle segments semiquadrate and without long setae, as in figure 16, j; gaster equal in length to thorax.

Type locality.—St. Paul, Minn.

Types.—U.S.N.M. No. 19936.

Host.—Eggs of leaf beetle, *Physonota unipunctata* (Say).

Distribution.—Maryland, Minnesota, South Dakota.

Remarks.—The characters of the male antennae show conclusively that this species and *ainsliei* Gahan are different; the differentiation of the females is, however, quite difficult.

TETRASTICHUS GELASTUS, new species

Black, with very faint iridescent reflections, area of head around mouthparts, base of gaster, front and middle coxae, and inner side of hind coxae, trochanters, and most of femora tan or brown; antennae, bases and apices of femora, and tibiae and tarsi light yellow or white.

Female.—Length, 1.8 mm. Antennae inserted dorsad of level of ventral margins of compound eyes, apex of scape not reaching level of anterior ocellus; first funicle segment one and one-half times as long as pedicel, second segment as long as pedicel, third segment slightly shorter than second, club twice as long as second funicle segment; length of malar space one-half as great as height of compound eye; a broad, rather poorly defined groove extending obliquely from antennal bases to ventral margins of compound eyes; postocellar line one and one-half times as long as ocellocular; interocellar triangle with several large, closely set punctures. Mesopraescutum with several longitudinal rugae on median area, confused, somewhat oblique and very irregular, elongate punctures on lateral areas, and two or three irregular rows of bristles present at each lateral margin; inner triangular part of scapula almost smooth, remainder of scapula strongly sculptured; mesoscutellum with deep, irregular, somewhat transverse folds on median sector, two lateral sectors with longitudinal rugae principally, small dorsal area of mesepisternum almost smooth, rest of thoracic pleuron strongly sculptured; submarginal vein of forewing with three or four dorsal bristles, stigmal vein short, slightly less than one-fourth as long as marginal vein; apex of hindwing blunt, fringe at posterior margin one-third as wide as wing at hamuli; metacoxa with an irregular longitudinal carina along outer dorsal and ventral margins. Surface of propodeum strongly sculptured, median, paraspiracular, and oblique carinae present, area between spiracle and paraspiracular carina extremely wide, spiracles contiguous with anterior margin of propodeum; surface of gaster smooth, one and one-quarter times as long as thorax.

Male.—Unknown.

Type locality.—Lutz, Fla.

Types.—U.S.N.M. No. 56240.

Described from the female holotype and three female paratypes, reared from nymphs of a psyllid, *Trioza* sp., on Chinese elm, June 18, 1939, by W. Kersey.

TETRASTICHUS MALACOSOMAE Girault

Tetrastichus malacosomae GIRAULT. Insector Inscitiae Menstruus, vol. 4, p. 110, 1916.—PORTER, Ent. News, vol. 28, p. 186, 1917.—LEONARD, New York (Cornell) Agr. Exp. Stat. Mem. 101, p. 984, 1928.

Black, or sometimes very dark brown, with iridescent blue or blue-green reflections; antennae yellow and brown; trochanters, basal three-fourths of femora, and often hind tibiae brown; apices of femora, front and middle tibiae, and tarsi white or yellow; abdomen sometimes brown at base.

Female.—Length, 1.1–1.5 mm. Antennae inserted at level of ventral margins of compound eyes; scape broad and short, only slightly more than twice as long as pedicel, apex of scape not reaching level of anterior ocellus, first funicle segment slightly shorter than second or third, latter two each slightly shorter than pedicel, club twice as long as pedicel; malar space one-half height of compound eye; postocellar line three times as long as ocellular. Mesopraescutum one-third wider than long and usually with one row of bristles at each lateral margin, a partial second row sometimes present; marginal vein of forewing with two dorsal bristles; apex of hindwing blunt, width of fringe at posterior margin one-third width of wing at hamuli; scutellar grooves vague anteriorly. Thorax wide, abdomen elongate and narrow; propodeum extremely short so that abdomen appears broadly joined to thorax; surface of propodeum almost smooth, median carina vague or wanting entirely; mesal length of propodeum one-fifth length of mesoscutellum; propodeal spiracles large, almost contiguous with anterior margin; gaster long, slender, twice as long as thorax.

Male.—Length, 0.8–1.1 mm. Scape with a darkened anterior carina two-thirds as long as scape; first funicle segment two-thirds as long as second, following three segments equal in length, funicle segments moniliform and without long setae; club almost three times as long as fourth funicle segment; gaster equal in length to thorax.

Type locality.—Maxwell, N. Mex.

Types.—U.S.N.M. No. 20446.

Hosts.—Eggs of tent caterpillars, *Malacosoma fragilis* Stretch, *M. americana* (Fabricius), *M. disstria* Huebner.

Distribution.—Delaware, Idaho, Massachusetts, Nebraska, New Mexico, New York, Oregon, Pennsylvania.

TETRASTICHUS BALDUFI, new species

Brown; antennae, trochanters, bases and apices of femora, tibiae, basal segments of tarsi, and usually spot at base of gaster white or yellowish; base of gaster may be tan, rather than yellow or white.

Female.—Length, 1.0–1.4 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus; first funicle segment slightly shorter than second, third and second equal in length; club two and one-half times as long as third funicle segment; length of malar space one-half height of compound eye; malar suture curved; postocellar line one and one-half times as

long as ocellocular. Mesopraescutum as wide as long and bearing two bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle; apex of hindwing acute, fringe at posterior margin one-half as wide as wing at hamuli. Mesal carina of propodeum wanting or only faintly indicated, paraspiracular carinae wanting, surface of propodeum smooth or very faintly roughened, mesal length of propodeum one-fourth length of mesoscutellum; propodeal spiracles almost touching anterior margin; gaster one-third longer than thorax.

Male.—Length, 1.0–1.2 mm. Scape three times as long as pedicel; funicle segments bearing conspicuously long bristles near bases, first funicle segment equal in length to pedicel, second segment one-eighth longer than first, third and fourth equal and each one-eighth longer than second, club one-fifth longer than scape; gaster slightly shorter than thorax.

Type locality.—Urbana, Ill.

Types.—U.S.N.M. No. 56241.

Described from the female holotype, male allotype, and many male and female paratypes reared from oakleaf gall of *Neuroterus verrucarum* (Osten Sacken). June 25, 1927, by W. V. Balduf; many additional specimens reared May 11–June 17, 1927, and May 1–26, 1928. All specimens reared from galls collected from the same tree.

TETRASTICHUS DYRUS, new species

FIGURE 16, *h*; 20, *e*

Black; apices of antennal scape and pedicel, flagellum, sometimes apices of coxae, bases and apices of femora, tibiae, and basal three segments of tarsi light yellow or white; antennal flagellum and tibiae sometimes very slightly darkened, femora occasionally almost entirely yellow.

Female.—Length, 0.9–1.1 mm. Antennae inserted at level of ventral margins of compound eyes, apex of scape not quite reaching level of anterior ocellus, pedicel enlarged at apex and slightly longer than first funicle segment, each funicle segment shorter and very slightly wider than segment proximad of it, club long, relatively slender, three times as long as third funicle segment (fig. 16, *h*); length of malar space two-thirds as great as height of compound eye; postocellar line twice as long as ocellocular. Mesopraescutum with two long bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle, marginal vein four and one-half times as long as stigmal; apex of hindwing acute, fringe at posterior margin two-thirds as wide as wing at hamuli. Surface of propodeum obscurely reticulated, paraspiracular carinae absent, well-marked oblique ones usually present, spiracle almost contiguous with anterior margin of propodeum; median length

of propodeum one-half as great as length of mesoscutellum; gaster as long as or slightly longer than thorax.

Male.—Length, 1.1 mm. Darkened anterior carina of scape minute, located at a point one-third the distance from apex to base of scape, pedicel one and two-thirds times as long as first funicle segment, second segment almost twice as long as first, third and fourth equal in length and each slightly longer than second, club two and one-half times as long as fourth funicle segment; funicle segments bearing conspicuously long bristles on elevations near bases of segments; marginal vein of forewing three and one-half times as long as stigmal, fringe at posterior margin of hindwing one-half as wide as wing at hamuli; gaster slightly longer than thorax.

Type locality.—Fairly Lake, Gallatin County, Mont.

Types.—U.S.N.M. No. 56242.

Described from 1 male and 10 female specimens, as follows: Female holotype, male allotype, and 1 female paratype from the type locality, reared from *Trioxa* sp. nymphs on *Angelica lyalli*, September 4, 1939, D. J. Pletsch; 2 female paratypes having the same locality, date and collector as above, but taken sweeping vegetation infested with undetermined psyllids; 5 female paratypes, same locality, date and collector, but reared from *Trioxa* sp. nymphs on *Thalictrum occidentale*; 10 female paratypes, Bozeman, Mont., reared from *Trioxa* sp. nymphs on *Salix* sp., September 23, 1939, D. J. Pletsch.

TETRASTICHUS TRIOZAE, new species

FIGURES 16, *i*, *l*; 20, *d*

Black, noniridescent; apices of scape and pedicel and variable areas of flagellum, wing veins, bases and apices of femora and tibiae, and basal segments of tarsi white or light yellow; anterior tibiae usually darkened only on outer face; base of gaster sometimes tan; antennae and legs of males sometimes entirely white or light yellow.

Female.—Length, 0.95–1.05 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; scape short, its apex reaching a point only two-thirds the distance from clypeal margin to anterior ocellus; pedicel one-half as long as scape, each funicle segment shorter and wider than that proximad of it; third segment three-fourths as long and one and one-third times as wide as first, maximum width of club almost twice as great as width of third funicle segment (fig. 16, *i*). Mesopraescutum with two bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle, stigmal vein one-third as long as marginal; apex of hindwing acute, fringe at posterior margin one-half as wide as wing at hamuli. Surface of propodeum almost smooth, faintly reticulated and with median carina

obsolescent or wanting, paraspiracular carinae absent, a few vague wrinkles present at posterior margin; spiracles large, contiguous with anterior margin, mesal length of propodeum one-third length of meso-scutellum; gaster and thorax equal in length.

Male.—Length, 0.7–0.9 mm. Antennal scape broadened from base to apex, twice as long as pedicel, each funicle segment bearing long setae on a basal elevation, first segment shorter than others, all funicle segments and club equal in width; fringe at posterior margin of hind-wing one-half as wide as wing at hamuli; gaster equal in length to thorax; male genitalia prominent, apparently never wholly retracted into abdomen, sagittae elongate, acutely pointed, aedeagus long, narrow, acute at apex.

Type locality.—Five miles northwest of Marinette, Ariz.

Types.—U. S. N. M. No. 56243.

Described from many male and female specimens, as follows: Female holotype, male allotype, and 5 female and 6 male paratypes, reared from nymphs of *Paratrioza cockerelli* (Sulc), April 9, 1935, by V. E. Romney; 17 female and 13 male paratypes, from 10 miles north of Phoenix, Ariz., reared from nymphs of *Paratrioza cockerelli*, April 1935, V. E. Romney; 3 females, Mesilla Valley, N. M., reared from *Paratrioza cockerelli* (?), October 1923, Chittenden No. 6900; 1 male, Hollister, Idaho, June 2, 1931, D. E. Fox; 1 male, Hobbs Butte, Idaho, June 11, 1931, in wind-vane trap; 2 females, Lawrence, Kans., reared from (?) *Calophya nigripennis* Riley, 1930, P. B. Lawson; 3 females, Spanaway, Wash., reared from infested *Amelanchier*-berry material, August 26, 1933, W. Baker; 5 females and 4 males, Billings, Mont., September 2–3, 1939, from *Paratrioza cockerelli* on tomato, H. B. Mills; 23 females and 29 males, Billings, Mont., September 11, 1939, from *Paratrioza cockerelli* nymphs, D. J. Pletsch; 9 females and 6 males, Colorado, February 12, 1940, from *Paratrioza cockerelli* on potato, Hill and Tate; 1 female and 5 males, Garden Grove, Calif., September 17, 1928, A. C. Davis; and 12 females and 2 males, Fort Collins, Colo., December 13, 1932, Colo. Agr. Coll. No. 5319. Many additional males and females, not included in the type series, were reared at Billings and Bozeman, Mont., from nymphs of *Paratrioza cockerelli* during September 1939 by D. J. Pletsch. Other specimens, not included in the type series, are from Scottsbluff, Nebr., reared from *Paratrioza cockerelli* on potato, August 20, 1939, by John Standish.

Remarks.—This species and *T. dryus* evidently are closely related to *Tetrastichus dryi* Waterston, which parasitizes "*Trioxa citri*" in Kenya Colony, Africa, and *Tetrastichus radiatus* Waterston, parasitic on *Euphalerus citri* (Kuwayama) in the Punjab, British India. All four species apparently possess the same general kind of remarkable male genitalia.

TETRASTICHUS OVIPRANSUS Crosby and Leonard

FIGURE 20, c

Tetrastichus ovipransus CROSBY and LEONARD, Ent. News, vol. 28, p. 368, 1917.

Shining black with an iridescent blue cast; antennae yellow or brown, apices of femora, tibiae, and bases of tarsi light yellow or white.

Female.—Length, 0.9–1.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not quite reaching level of anterior ocellus, second funicle segment slightly longer than first, second and third equal in length, club as long as funicle; malar space two-thirds height of compound eye; ocellocular line one-half as long as postocellar. Mesopraescutum wider than long and bearing three bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle, stigmal vein with an apical spur (fig. 20, c); outer margin of wing with a fringe of long setae; hindwing acute at apex. Propodeum faintly shagreened, rather faint median and paraspicular carinae present; mesal length of propodeum one-third that of mesoscutellum; propodeal spiracles almost round and separated from anterior margin by a space equal to diameter of a spiracle; gaster as long as thorax.

Male.—Unknown.

Type locality.—Norfolk, Va.

Types.—Cornell University Collection No. 76.

Host.—Eggs of the sumac leaf beetle, *Blepharida rhois* (Forster).

Distribution.—Virginia.

TETRASTICHUS XANTHOMELAENAE (Rondani)

Oomyzus gallerucae RONDANI [not Fonscolombe], Bol. Comm. Agr. Parma, vol. 3, p. 137, 1870; Bol. Soc. Ent. Ital., vol. 3, p. 53, 1872; vol. 9, p. 191, 1877.

Oomyzus xanthomelaenae RONDANI, Repertorio degli insetti parassiti e della loro vittime, pt. 2, p. 16, 1872.

Tetrastichus xanthomelaenae (Rondani) MARCHAL, Bull. Soc. Ent. France, 1905, pp. 64, 81.—HOWARD, Journ. Econ. Ent., vol. 1, p. 281, 1908.—MASI, Bol. Portici Scuola Super. Agr., Lab. Zool. Gen. e Agr., vol. 3, p. 131, 1908.—SMITH, Rep. State Ent. New Jersey, 1908, p. 312; 1909, p. 411.—BRITTON, Rep. State Ent. Connecticut, No. 8, p. 821, 1909.—SILVESTRI, Bol. Portici Scuola Super. Agr., Lab. Zool. Gen. e Agr., vol. 4, p. 271, 1910.—HOWARD and FISKE, U. S. Bur. Ent. Bull. 91 (n. s.), p. 40, 1911.—KURDJUMOV, Russ. Ent. Obozr. (Rev. Russe Ent.), vol. 13, p. 253, 1913.—HOWARD, Journ. Econ. Ent., vol. 10, p. 504, 1917.—MARCHAL and FOEX, Ann. Epiphyt., vol. 6, p. 14, 1919.—PARKER, Bull. Soc. Ent. France, vol. 93, p. 293, 1924.—HOWARD, Rep. Chief U. S. Bur. Ent., 1926, p. 28.—PROVASOLI, Bol. Lab. Zool. Milano, vol. 3, p. 53, 1932.—HRISAFI, Notat. Biol., vol. 2, p. 37, 1934.—STRONG, Rep. Chief U. S. Bur. Ent., 1935, p. 60.—FLANDERS, Journ. Econ. Ent., vol. 29, p. 1024, 1936.—BERRY, Journ. Agr. Res., vol. 57, p. 859, 1938.

Dark, iridescent blue-green or green; antennae usually, apices of femora, tibiae, and bases of tarsi white or light yellow.

Female.—Length 0.75 mm. Antennae inserted at level of ventral margins of compound eyes; scape short, its apex not reaching level of anterior ocellus; all funicle segments equal in length, and each three-quarters as long as pedicel, club as long as funicle; postocellar line twice as long as ocellocular. Mesopraescutum wider than long and bearing one row of bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle; apex of hindwing acute, fringe at posterior margin one-half as wide as wing at hamuli. Surface of propodeum almost smooth, only very faintly reticulated; paraspiracular carinae wanting; mesal length of mesoscutellum three and one-half times as great as mesal length of propodeum; propodeal spiracles contiguous with anterior margin; length of gaster equal to length of thorax, gaster somewhat rounded, and flattened in dry specimens.

Male.—Length, 0.65 mm. Scape with a minute anterior carina; pedicel one-third as long as scape and greatly enlarged at apex, second, third, and fourth funicle segments equal, first segment one-half as long as second; funicle segments bead-like and without long bristles, club as long as three distal funicle segments.

Type locality.—Parma, Italy.

Types.—Probably in the Pondani collection in Parma, Italy.

Host.—Eggs of *Galerucella xanthomelaeana* (Schrank), the elm leaf beetle.

Distribution.—Western and central Europe; Massachusetts, New Jersey, New York.

TETRASTICHUS COMPSIVORUS Crawford

Tetrastichus compsivorus CRAWFORD, Insecutor Inscitiae Menstruus, vol. 2, p. 180, 1914.

Very dark brown, almost black; trochanters, apices of femora and tibiae, and basal segments of middle and hind tarsi white or light yellow.

Female.—Length, 1.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not reaching level of anterior ocellus, pedicel slightly less than one-half as long as scape, first and second funicle segments equal and each slightly shorter than pedicel, third segment slightly shorter than second, club equal in length to scape, malar space three-fifths height of compound eye. Mesopraescutum with one row of bristles at each lateral margin; submarginal vein of forewing bearing one dorsal bristle, outer margin of forewing with a fringe of long setae; apex of hindwing acute. Surface of propodeum almost smooth, slightly reticulated, median carina vague, paraspiracular carinae wanting; mesal length one-third

length of mesoscutellum; propodeum and metanotum of equal length at meson; gaster slightly longer than thorax.

Male.—Length, 0.9 mm. Funicle segments slightly enlarged near bases, and bearing setae slightly longer than segments; pedicel slightly longer than first funicle segment, first and second funicle segments equal in length; club one-fourth longer than pedicel and first funicle segment; gaster and thorax equal in length.

Type locality.—Chickasha, Okla.

Types.—U.S.N.M. No. 19067. (Specimens in very poor condition.)

Host.—Eggs of snout beetle, *Compsus auricephalus* (Say).

Distribution.—Mississippi, Oklahoma, Texas.

TETRASTICHUS EUPLECTRI Gahan

Tetrastichus euplectri GAHAN, Proc. U. S. Nat. Mus., vol. 48, p. 167, 1914.—
VICKERY, Journ. Econ. Ent., vol. 8, p. 391, 1915.

Body mostly iridescent blue-green; base and apex of abdomen somewhat brown, legs (except coxae) and base of gaster of male white.

Female.—Length, 1.5 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; apex of scape reaching level of vertex; funicle segments long, first one and two-thirds times as long as pedicel, second twice as long as pedicel, third as long as first, club twice as long as first funicle segment; length of malar space one-half height of compound eye; postocellar line one and two-thirds times as long as ocellular. Mesopraescutum two-thirds as long as wide and bearing three bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle; hindwing acute at apex, fringe at posterior margin one-third as wide as wing at hamuli. Propodeum shagreened, mesal length slightly less than one-half as great as length of mesoscutellum; propodeum bearing median, paraspicular, and oblique carinae, as in figure 21, *d*; propodeal spiracles not quite touching anterior margin; gaster nearly twice as long as thorax.

Male.—Length, 1.1 mm. Scape enlarged and bearing a darkened anterior carina one-half as long as scape, first funicle segment equal in length to pedicel, second, third, and fourth equal in length and each one-quarter longer than pedicel, funicle segments enlarged at base and narrowed toward apex, and bearing long setae, club as long as two distal funicle segments; gaster equal in length to thorax.

Type locality.—Tallulah, La.

Types.—U.S.N.M. No. 18338.

Hosts.—*Euplectrus plathyphenae* Howard, *Meteorus* sp., primary parasites on the larvae of various Lepidoptera.

Distribution.—Louisiana, Texas.

TETRASTICHUS AENEOVIRIDIS (Girault), new combination

Trichaporus aeneoviridis GIRAULT, Can. Ent., vol. 44, p. 75, 1912.—FRISON, Bull. Illinois Nat. Hist. Survey, vol. 16, p. 223, 1927.

Bright iridescent green, with occasional purple reflections; legs (except bases of coxae) entirely light yellow or white; antennae and area of head around mouthparts tan or yellowish.

Female.—Length, 1.8 mm. Apex of scape reaching level of vertex; second funicle segment slightly longer than first, third equal to first; mesopraescutum with four or five bristles at each lateral margin, median groove vague, almost obliterated; one dorsal bristle on submarginal vein of forewing; hindwing blunt at apex; surface of propodeum shagreened, paraspicular carinae present, spiracles separated from anterior propodeal margin by a space equal to diameter of spiracle.

Male.—Unknown.

Type locality.—Centralia, Ill.

Types.—Lectotype, paratypes, and metatypes in Illinois Natural History Survey Collection; paratypes, U.S.N.M. No. 12200.

Host.—This species was originally said to be a primary parasite of the larva of the apple-tree tent caterpillar, *Malacosoma americana* (Fabricius), but the insectary records in the Illinois Natural History Survey show that the specimens came from syrphid puparia.

Distribution.—Illinois.

TETRASTICHUS DIARTHROMYIAE Gahan

Tetrastichus diarthromyiae GAHAN, Proc. Ent. Soc. Washington, vol. 25, p. 65, 1923.—HAMILTON, Maryland Agr. Exp. Stat. Bull. 269, p. 23, 1924.

Shining black or very dark brown, sometimes faintly iridescent bluish or greenish; antennae usually, trochanters, bases and apices of femora, tibiae, and basal segments of middle and hind tarsi white or light yellow.

Female.—Length, 1.0–1.5 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus, first funicle segment three-quarters as long as second, third as long as first, club slightly more than twice as long as first funicle segment; length of malar space two-thirds height of compound eye; postocellar line twice as long as ocellular. Mesopraescutum slightly wider than long and bearing three bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle; apex of hindwing acute, fringe at posterior margin one-half width of wing at hamuli. Surface of propodeum shagreened, mesal length one-fifth length of mesoscutellum, both median and paraspicular carinae present; propodeal spiracles near to but not quite touching anterior margin; gaster one and one-half times as long as thorax.

Male.—Unknown.

Type locality.—College Park, Md.

Types.—U.S.N.M. No. 25592.

Host.—The chrysanthemum gall midge, *Diarthronomyia hypogaea* (Loew).

Distribution.—Maryland.

TETRASTICHUS TIBIALIS (Ashmead)

Tetrastichodes tibialis ASHMEAD, Trans. Amer. Ent. Soc., vol. 21, p. 344, 1894.

Tetrastichus tibialis (Ashmead) GIRAULT, Societas Entomologica, vol. 31, p. 35, 1916 [not *Tetrastichus tibialis* Kurdjumov].

Body very dark brown, or black with faint iridescent green reflections; scape and part of pedicel of antennae, apices of femora, tibiae, and tarsi white.

Female.—Length, 1.4 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not reaching level of anterior ocellus, three funicle segments equal in length, club slightly shorter than two funicle segments combined; malar space three-fifths height of compound eye; postocellar line twice as long as ocellocular. Mesopraescutum wider than long, and each lateral margin with one row consisting of but three or four bristles; submarginal vein of forewing with one dorsal bristle; apex of hindwing acute, fringe at posterior margin one-half as wide as wing at hamuli. Surface of propodeum roughened; median, paraspiracular, and oblique carinae present, as in fig. 21, *d*; median length of propodeum one-third as great as length of mesoscutellum; rudimentary petiole present; propodeal spiracles not quite contiguous with anterior margin; gaster equal in length to thorax.

Male.—Length, 1.2 mm. Funicle segments enlarged near bases and bearing setae slightly longer than the segments themselves; gaster slightly shorter than thorax.

Type locality.—Morgantown, W. Va.

Types.—U.S.N.M. No. 41341. (Specimens in very poor condition.)

Hosts.—*Apanteles* sp. parasitic on *Apatela americana* (Harris), the American dagger moth; *Apanteles* sp. parasitic on other, undetermined Lepidoptera.

Distribution.—Delaware, Ontario, West Virginia.

TETRASTICHUS SCOLYTI Ashmead

Tetrastichus scolyti ASHMEAD, Trans. Amer. Ent. Soc., vol. 21, p. 343, 1894.

Black with iridescent-green or blue-green cast; scape and ventral side of pedicel and flagellum, apices of femora and tibiae, and basal segments of tarsi white or yellow; setae of head may be white; basal parts of tibiae may be lighter in color than bases of femora.

Female.—Length, 2.0 mm. Antennae inserted at level of central margins of compound eyes, apex of scape not quite reaching level of anterior ocellus, funicle segments long, first one and one-half times as long as pedicel, second one and two-thirds as long as pedicel and third one and one-third times as long as pedicel, club twice as long as pedicel; malar space two-thirds height of compound eye; postocellar line one and one-third times as long as ocellocular. Mesopraescutum as long as wide and bearing one row of bristles at each lateral margin: submarginal vein of forewing with one dorsal bristle; apex of hindwing blunt, fringe at posterior margin one-fifth as wide as wing at hamuli. Propodeum shagreened, mesal length one-third length of mesoscutellum, both median and paraspiracular carinae present, spiracles separated from anterior margin by a space equal to one-half length of a spiracle; gaster one and one-third times as long as thorax.

Male.—Unknown.

Type locality.—Morgantown, W. Va.

Types.—U.S.N.M. No. 41339. (Specimens in very poor condition.)

Host.—The shot-hole borer, *Scolytus rugulosus* Ratzeburg.

Distribution.—New Jersey, West Virginia.

TETRASTICHUS AGRILI Crawford

Tetrastichus agrili CRAWFORD, Insecutor Inseitiarum Menstruus, vol. 2, p. 181, 1914.—LEONARD, New York (Cornell) Agr. Exp. Stat. Mem. 101, p. 984, 1928.

Black, with iridescent blue-green cast; mouthparts, scape, trochanters, tibiae, and tarsi white or light yellow.

Female.—Length, 3.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus, first funicle segment one-fifth longer than second, third five-sixths as long as second, club one and two-thirds times as long as third funicle segment; malar space two-thirds height of compound eye; postocellar line twice as long as ocellocular line. Pronotum with well-defined femoral grooves, as in figure 17, *e*; mesopraescutum as long as wide and bearing a single row of bristles at each lateral margin; submarginal vein of forewing with a single dorsal bristle; apex of hindwing blunt, fringe at posterior margin one-sixth or one-seventh as wide as wing at hamuli. Propodeum shagreened, mesal length one-fourth as great as length of mesoscutellum, both median and paraspiracular carinae present; spiracles almost touching anterior margin of propodeum; gaster long, narrow, acutely pointed, twice as long as thorax.

Male.—Unknown.

Type locality.—Geneva, N. Y.

Types.—U.S.N.M. No. 19068.

Host.—The sinuate pear tree borer, *Agilus sinuatus* Olivier.

Distribution.—New York.

TETRASTICHUS SCRIPTUS, new species

Dark, iridescent green, with antennal pedicel and flagellum, coxae, basal two-thirds of femora, and apical segment of each tarsus brown; antennal scape, trochanters, apices of femora, tibiae, and basal segments of tarsi light yellow.

Female.—Length, 1.4–1.8 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; apex of scape reaching level of vertex; pedicel slightly more than one-half as long as first funicle segment, first and second segments equal in length, third slightly shorter than second, club as long as second and third combined; length of malar space two-thirds as great as height of compound eye, postocellar line one and one-half times as long as ocellocular. Mesopraescutum bearing one row of bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle; apex of hindwing blunt, fringe at posterior margin one-third as wide as wing at hamuli; thoracic pleuron and bases of metacoxae shagreened. Surface of propodeum shagreened, strong median, paraspiracular, and oblique carinae present; mesal length of propodeum two-fifths as great as length of mesoscutellum; spiracles separated from anterior margin of propodeum by a space one-half as great as length of a spiracle; gaster longer than thorax, provided with rather inconspicuous setae on sides and venter.

Male.—Unknown.

Type locality.—Irvington, N. J.

Types.—U.S.N.M. No. 56244.

Described from the female holotype and four female paratypes reared from a primary parasite (*Euplectrus* sp.?) parasitic on the cottonwood leaf beetle, *Lina scripta* (Fabricius), by E. L. Dickerson in July.

TETRASTICHUS PRODUCTUS Riley

Tetrastichus productus RILEY, Proc. U. S. Nat. Mus., vol. 8, p. 419, 1885.—GAHAN, U. S. Dept. Agr. Misc. Publ. 174, p. 143, 1933 (this paper contains a bibliography complete through 1932).

Very dark brown, almost black, with iridescent green reflections; trochanters, tibiae, and tarsi white; antennae sometimes tan or yellow; mesal lobe of metanotum yellow.

Female.—Length, 2.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not quite reaching level of anterior ocellus, first funicle segment slightly longer than second, second and third segments equal in length, club as long as last two funicle segments combined; length of malar space height of compound

eye; postocellar line one and one-half times as long as ocellocular. Mesopraescutum as long as wide, with one row of bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle; hindwing blunt at apex, fringe at posterior margin one-fourth as wide as wing at hamuli. Surface of propodeum roughened; mesal length of propodeum three-eighths length of mesoscutellum; median, paraspiracular, and short, oblique carinae present, much as in figure 21, *d*; rudimentary petiole present; propodeal spiracles separated from anterior margin by a space equal to one-half length of a spiracle; gaster twice as long as thorax.

Male.—Length, 1.5 mm. Darkened anterior carina of scape two-thirds as long as scape; first funicle segment four-fifths as long as second segment, three distal segments equal in length, funicle segments enlarged near bases and bearing long setae, club as long as first three funicle segments; gaster equal in length to thorax.

Type locality.—Cadet, Mo.

Types.—U.S.N.M. No. 2796.

Host.—The Hessian fly, *Phytophaga destructor* (Say). (May be incorrect.)

Distribution.—Missouri.

TETRASTICHUS PARACHOLUS, new species

Very dark brown or black, with faint brassy iridescence; scape and apex of pedicel of antenna, apices of coxae, bases and apices of femora, tibiae, and tarsi white or light yellow.

Female.—Length, 1.5–1.8 mm. Entire body long and narrow. Antennae inserted at level of ventral margins of compound eyes; apex of scape not quite reaching level of ventral margin of anterior ocellus; first funicle segment slightly longer than second, second and third funicle segments equal in length and their combined lengths equal to that of club; ocellocular line two-thirds as long as postocellar. Mesopraescutum bearing one row of bristles at each lateral margin; submarginal vein of forewing with one dorsal bristle; apex of hindwing blunt, fringe at posterior margin slightly less than one-third as wide as wing at hamuli; entire surface of thoracic pleuron reticulated; metacoxae shagreened near base, smooth at apex. Surface of propodeum shagreened, strong median and paraspiracular carinae present; mesal length of propodeum one-third as great as length of mesoscutellum; propodeal spiracles separated from anterior margin by a space one-half as great as diameter of a spiracle; rudimentary petiole present, its dorsal surface faintly reticulated; gaster elongate, narrow, longer than thorax.

Male.—Length, 1.5 mm. Funicle segments enlarged near bases and provided with long setae; pedicel and first funicle segment equal in

length, three following segments equal in length and each one-fifth longer than first, club three times as long as first segment; gaster as long as thorax.

Type locality.—Vienna, Va.

Types.—U.S.N.M. No. 56245.

Described from 20 female and 4 male specimens, all said to have been reared from the goldenrod stem-gall moth, *Gnorimoschema gallaesolidaginis* (Riley): Holotype female and 9 female paratypes, Vienna, Va., May 17, 1911. R. A. Cushman; allotype male and 8 female and 3 male paratypes, Richmond, Va., G. W. Barber; 2 female paratypes, New Lisbon, N. J., May 15, 1931, E. P. Darlington. An additional lot of 14 females and 3 males, not included in the type series, were reared from *G. gallaesolidaginis* at Washington, D. C., March 22, 1886. These specimens were set aside as a new species by Ashmead and bear a manuscript name, but his description was never published.

Remarks.—Although said to have parasitized the goldenrod gall moth, this species may actually have come from some parasite or inquiline associated with that moth.

TETRASTICHUS TESSERUS, new species

Shining, jet black; area of head around mouthparts, base of antennal scape, and most of femora dark brown; bases and apices of femora, tibiae, and tarsi light yellow or white; apices of tarsi sometimes darkened; legs of male almost entirely yellow; old or teneral specimens may be brown rather than black. Surfaces of thorax and abdomen with strong, reticulate sculpturing, much as in figure 18, *c*.

Female.—Length, 1.6–2.1 mm. Antennae inserted dorsad of level of ventral margins of compound eyes; apex of scape surpassing level of vertex; pedicel slightly more than one-half as long as first funicle segment, second segment four-fifths as long as first, second and third equal in length, club one and one-half times as long as third funicle segment; length of malar space two-thirds as great as height of compound eye; postocellar line slightly longer than ocellular, interocellar triangle usually with seven large, setigerous punctures. Mesopraescutum short, semiquadrate, as in figure 18, *c*, one row of bristles present at each lateral margin; submarginal vein of forewing with three or four dorsal bristles, marginal vein four times as long as stigmal; apex of hindwing blunt, fringe at posterior margin one-third as wide as wing at hamuli; surface of propodeum shagreened, but paraspicular carinae absent or only vaguely indicated, spiracles contiguous with anterior propodeal margin, median length of propodeum one-third as great as length of mesoscutellum; gaster twice as long as thorax.

Male.—Length, 1.6–1.7 mm. Anterior carina of scape extending almost the entire length of scape, pedicel and first funicle segment

equal in length, fourth segment twice as long as first, club two and one-half times as long as fourth funicle segment; funicle segments bearing conspicuously long bristles on enlargements near bases of segments; marginal vein of forewing three times as long as stigmal; gaster one and one-fourth times as long as thorax.

Type locality.—Midland County, Mich.

Types.—U.S.N.M. No. 56246.

Described from 9 females and 3 males, as follows: Holotype female, collected at the type locality, June 28, 1938, R. R. Dreisbach; 1 female paratype, collected at White Heath, Ill., June 13, 1939, P. C. Dirks; 4 female paratypes, collected at Arlington, Va.; 1 female paratype, Sergeant Bluff, Iowa, reared from *Asteromyia* sp. gall on goldenrod, C. N. Ainslie; allotype male and 1 female paratype, Sioux City, Iowa, reared from *Cecidomyia* sp. galls on goldenrod, 1917, C. N. Ainslie; and 1 female and 1 male paratypes, Sioux City, Iowa, reared from *Lasioptera* sp. galls on goldenrod, October 6, 1916, C. N. Ainslie.

Remarks.—Despite the apparent diversity of hosts, as indicated above, this species is very likely to be restricted to a single gall maker on goldenrod.

TETRASTICHUS FUMIPENNIS (Girault), new combination

FIGURES 13, *c*; 21, *a*

Neomphaloidella fumipennis GIRAULT, Chalcidoidea nova Marilandensis, pt. 1, p. 2, 1917.

Very dark, steel blue or shining black, teneral specimens brown; variable areas on scape, pedicel, apices of femora, tibiae, and basal segments of tarsi light yellow or white; mouthparts, apices of pedicel and flagellum, trochanters, basal two-thirds of femora, and apical segment of each tarsus brown; forewing sometimes with a vague brown cloud in basal half; surfaces of head, thoracic notum, and abdomen uniformly covered with scalelike shagreening (fig. 18, *c*).

Female.—Length, 1.3–1.5 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes, apex of scape reaching level of anterior ocellus; all funicle segments equal in length, and each as long as pedicel, club two and one-half times as long as pedicel; length of malar space four-fifths height of compound eye; postocellar line twice as long as ocellocular. Mesopraescutum wider than long, and bearing one or two somewhat irregular rows of bristles at each lateral margin (fig. 18, *c*); submarginal vein of forewing with two or three dorsal bristles, marginal vein twice as long as stigmal; apex of hindwing blunt, fringe at posterior margin one-fourth as wide as wing at hamuli; surface of propodeum reticulated, median, paraspiracular, and oblique carinae present (fig. 21, *a*), mesal length of propodeum one-third length of mesoscutellum; propodeal spiracles

separated from anterior margin by a space one-half as great as length of a spiracle; gaster equal to or slightly longer than thorax; entire dorsum of gaster shagreened.

Male.—Length, 1.1 mm. Darkened anterior carina of scape two-thirds as long as scape; first funicle segment shorter than second; funicle segments enlarged near bases and bearing setae much longer than the segments themselves; gaster as long as thorax.

Type locality.—Glenn Dale, Md.

Type.—U.S.N.M. No. 20444. (Specimen in poor condition.)

Host.—Black blister leaf gall of *Asteromyia carbonifera* (Felt) on goldenrod; some specimens also were said to have been reared from the goldenrod gall moth, *Gnorimoschema gallaesolidaginis* (Riley), but this is probably an error.

Distribution.—District of Columbia, Illinois, Indiana, Iowa, Maryland, Virginia.

TETRASTICHUS HAGENOWII (Ratzeburg)

Entedon hagenowii RATZEBURG, Die Ichneumoniden der Forstinsecten . . . , vol. 3, p. 211, 1852.

Geniocerus hagenowii (Ratzeburg) KURDJUMOV, Russ. Ent. Obozr. (Rev. Russe Ent.) vol. 13, p. 249, 1913.—CRAWFORD, Proc. U. S. Nat. Mus., vol. 48, p. 584, 1915.

Blattotetrastichus hagenowi (Ratzeburg) GIRAULT, Ent. News, vol. 28, p. 257, 1917.

Tetrastichus hagenowi (Ratzeburg) ASHMEAD, Fauna Hawaiiensis, vol. 1, p. 329, 1901.—FULLAWAY, Proc. Haw. Ent. Soc., vol. 2, p. 287, 1913.—GAHAN, Proc. U. S. Nat. Mus., vol. 48, p. 168, 1914.—SEVERIN and SEVERIN, Journ. Econ. Ent., vol. 8, p. 329, 1915.—MARLATT, U. S. Dept. Agr. Farmers' Bull. 658, p. 11, 1915.—MASI, Nov. Zool., vol. 24, p. 213, 1917.—SEIN, Puerto Rico Dept. Agr. and Comm. Circ. 64, p. 5, 1923.—TIMBERLAKE, Proc. Haw. Ent. Soc., vol. 5, p. 442, 1924.—WILLIAMS, Handbook of insects, p. 256, 1931.

Tetrastichoides floridanus ASHMEAD, Proc. Amer. Ent. Soc., vol. 14, p. 203, 1887.

Tetrastichoides browni ASHMEAD, Proc. U. S. Nat. Mus., vol. 29, p. 113, 1905. (New synonymy.)

Body black, with faint iridescent green reflections; areas of head around mouthparts, scape and pedicel, tegulae, legs (except procoxae), and sometimes base of gaster white or yellow; entire supraclypeal area of head may be yellow.

Female.—Length, 1.2–2.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus, first funicle segment long, one-third longer than second segment, third slightly shorter than second, funicle segments densely covered with short bristles, club considerably broader than funicle segments and short, only one-fourth longer than second funicle segment; malar space one-half height of compound eye; postocellar line twice as long as ocellular. Entire surface of mesopraescutum cov-

ered with bristles, some of which are contiguous with mesal furrow (fig. 19, *c*); submarginal vein of forewing with four to six dorsal bristles; apex of hindwing blunt, fringe at posterior margin one-sixth width of wing at hamuli. Surface of propodeum smooth, median carina only present; mesal length one-third length of mesoscutellum, propodeal spiracles almost contiguous with anterior margin, length of spiracle one-half length of lateral margin of propodeum; minute petiole usually discernible; gaster slightly longer than thorax.

Male.—Length, 1.2–1.9 mm. Scape with darkened anterior carina extending from near base to apex; first funicle segment four-fifths as long as pedicel, second and third segments equal in length and each as long as pedicel, fourth segment as long as first, club slightly longer than second and third funicle segments combined, long setae borne singly or in pairs on dorsal sides of funicle segments, these setae slightly longer than segments bearing them; gaster as long as or slighter longer than thorax.

Type locality.—Germany.

Types.—Presumably in the Forestry Academy in Eberswalde, Germany.

Hosts.—Egg capsules of domestic cockroaches, *Blatta orientalis* (Linnaeus), *Blatella germanica* (Linnaeus), *Periplaneta americana* (Linnaeus), *P. australasiae* (Fabricius), and possibly other roaches.

Distribution.—Probably worldwide; commonly collected or reared in the eastern and southern United States and the West Indies islands; also known from South and Central America, Europe, the Hawaiian Islands, and the Orient.

TETRASTICHUS CASSIDIS, new species

Dull brown, with scape, pedicel and funicle of antenna, areas bordering sutures on mesopleuron, apices of forecoxae, entire middle and hindcoxae, femora, tibiae, and tarsi light yellow; antennal club slightly darkened, and pedicel and funicle sometimes darkened toward apices.

Female.—Length, 0.8–1.0 mm. Antennae inserted at level of ventral margins of compound eyes and only slightly ventrad of center of frons; apex of scape reaching level of vertex; pedicel slightly shorter than first funicle segment; all funicle segments equal in length, club as long as two funicle segments combined; postocellar line as long as ocellular line. Mesopraescutum wider than long and bearing one row of bristles at each lateral margin; submarginal vein of forewing with two or three dorsal bristles. Surface of propodeum covered with minute reticulations, paraspiracular carinae vague or absent; mesal length of propodeum one-third as great as length of mesoscutellum; propodeal spiracles contiguous with anterior margin; gaster ovoid, slightly shorter than thorax, venter with conspicuously long bristles.

Male.—Length, 0.9 mm. Funicle segments bearing conspicuously long setae on dorsal enlargements near bases; pedicel one-sixth longer than first funicle segment, second one-third longer than first, third and fourth each as long as second, club as long as last two funicle segments combined; length of postocellar line greater than length of ocellocular line; gaster shorter than thorax.

Type locality.—Baton Rouge, La.

Types.—U.S.N.M. No. 56247.

Described from 9 female and 2 male specimens as follows: Female holotype and two female paratypes, reared from larva of *Chirida signifera* (Herbst), August 24, 1921, Guy Fletcher; male allotype and one male and six female paratypes, reared from larva of the golden tortoise beetle, *Metriona bicolor* (Fabricius), July 1921, C. E. Smith.

TETRASTICHUS SEMIAURATICEPS (Girault), new combination

Epitetrastichus semiauraticeps GIRAULT, Proc. U. S. Nat. Mus., vol. 51, p. 127, 1916.

Black with a strong, iridescent blue cast; supraclypeal area of head, anterior margin of antennal scape, apex of pedicel, tegulae, inner triangular part of scapulae, apices of coxae, trochanters, bases and apices of femora, tibiae, and basal segments of tarsi yellow or white; almost entire head may be yellow.

Female.—Length, 2.3 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus, first and second funicle segments equal in length, third segment slightly shorter than second, club as long as first two funicle segments combined; length of malar space three-fifths as great as height of compound eye; ocellocular line almost as long as postocellar. Pronotum with femoral grooves as in figure 17, *e*; mesopraescutum as long as wide and bearing one row of bristles at each lateral margin; submarginal vein of forewing with four or five dorsal bristles, stigmal vein one-fifth length of marginal; hindwing blunt at apex, fringe at posterior margin one-fifth width of wing at hamuli. Surface of propodeum faintly reticulated, almost smooth, median carina only present; mesal length of propodeum one-fifth length of mesoscutellum; propodeal spiracles contiguous with anterior margin, minute petiole partly differentiated; gaster one and one-half to one and two-thirds times as long as thorax.

Male.—Unknown.

Type locality.—Denver, Colo.

Type.—U.S.N.M. No. 19643.

Hosts.—Reared from bud gall on *Pinus scopulorum* and needle gall on *Pinus ponderosa*; hosts probably one or more species of midges.

Distribution.—Arizona, Colorado, Maine.

TETRASTICHUS LONGICORPUS (Girault), new combination

FIGURES 16, *a*; 17, *e*

Neotetrastichodes longicarpus GIRAULT, Proc. U. S. Nat. Mus., vol. 51, p. 129, 1916.

Yellow with variable, somewhat iridescent dark spots; all of head but posterior side, dorsolateral areas of pronotum, prepectus, lateral and inner triangular parts of scapulae, lateral and posterior areas of mesopraescutum, all of mesoscutellum but spot at anterior margin on meson and areas bordering sutures and grooves, area around mesopleural suture, median lobe of metanotum, anterior coxae, and apices of middle and hind coxae, more distal segments of all legs, and base of gaster yellow; male mostly shining black.

Female.—Length, 3.0–3.5 mm. Antennae inserted nearly in center of frons, dorsad of level of ventral margins of compound eyes as in figure 16, *a*; apex of scape reaching level of anterior ocellus, first funicle segment one-fifth longer than second, second and third almost equal in length, club twice as long as second funicle segment; length of malar space two-thirds as great as height of compound eye; postocellar and ocellocular lines equal in length. Pronotum with a femoral groove (fig. 17, *e*); mesopraescutum as long as wide and bearing one row of bristles at each lateral margin; submarginal vein of forewing with five to seven dorsal bristles, marginal vein four times as long as stigmal; hindwing blunt at apex, fringe at posterior margin one-fifth width of wing at hamuli; scutellum usually bearing three pairs of bristles. Propodeum faintly reticulated, almost smooth, median carina only present; mesal length of propodeum one-fifth length of mesoscutellum; spiracles contiguous with anterior margin; rudimentary petiole present; gaster more than twice as long as thorax.

Male.—Length, 2.25 mm. Scape greatly enlarged, without a darkened anterior carina; first funicle segment slightly shorter than second, three distal segments subequal in length, funicle segments enlarged near bases and bearing conspicuously long setae; length of malar space two-thirds height of compound eye; mesal length of propodeum one-third as great as length of mesoscutellum; gaster and thorax equal in length.

Type locality.—Las Vegas, N. Mex.

Types.—U.S.N.M. No. 19645.

Host.—The western pine tip moth, *Rhyacionia frustrana bushnellii* (Busck), on *Pinus ponderosa*.

Distribution.—New Mexico.

TETRASTICHUS OKLAHOMA (Girault), new combination

Neomphaloidella oklahoma GIRAULT, Descriptiones stellarum novarum, p. 9, 1917.

Black; area of head around ocelli, bases of coxae, and gaster very dark brown; area of head around mouthparts, tegulae, inner trian-

gular part of scapulae, mesal lobe of metanotum, apices of coxae, trochanters, bases and apices of femora, tibiae, and basal segments of middle and hind tarsi white or light yellow.

Female.—Length, 2.5–3.0 mm. Antennae inserted considerably dorsad of level of ventral margins of compound eyes, as in figure 16, *a*; apex of scape slightly exceeding level of vertex, funicle segments slender, elongate, first segment one and one-fifth times as long as second, club one and one-fifth times as long as second segment; length of malar space five-eighths height of compound eye; postocellar and ocellocular lines equal in length. Mesopraescutum one-third wider than long and bearing one and a partial second row of bristles at each lateral margin; submarginal vein of forewing with four or five dorsal bristles; stigmal vein one-fourth as long as marginal vein; hindwing blunt at apex, fringe at posterior margin one-fifth width of wing at hamuli. Surface of propodeum faintly reticulated, median carina only present; mesal length of propodeum almost one-half as great as length of mesoscutellum; propodeal spiracles contiguous with anterior margin; gaster elongate, one and two-fifths times as long as thorax.

Male.—Length, 1.7 mm. Scape bearing a small darkened anterior carina near apex; all funicle segments equal in length and each one and two-fifths times as long as pedicel, funicle segments enlarged near bases and bearing conspicuously long bristles, club one-half as long as funicle; gaster as long as thorax.

Type locality.—Tulsa, Okla.

Type.—U.S.N.M. No. 20244.

Host.—Associated with joint worm, *Harmolita* sp., in grass stems; actual host unknown.

Distribution.—Oklahoma, Utah.

TETRASTICHUS ARGYRUS, new species

Body black, clothed with long, silver-colored bristles; frons, antennae, most of femora and tibiae, front tarsi and apical segment of middle and hind tarsi, and small areas at base and apex of gaster dark brown; darkened parts of tibiae lighter brown than those of femora; bases and apices of femora and tibiae and basal three segments of middle and hind tarsi light yellow or white.

Female.—Length, 2.0 mm. Entire body elongate, slender. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of ventral margin of anterior ocellus; funicle segments elongate, club short, first and second funicle segments equal in length and each almost one and one-half times as long as pedicel, third segment slightly shorter than second, club only one and one-

third times as long as first funicle segment; postocellar line twice as long as ocellocular, area of interocellar triangle with several short, irregular, transverse rugae. Mesopraescutum with long bristles distributed over its entire surface in a rather haphazard manner; submarginal vein of forewing with five dorsal bristles, marginal vein three times as long as stigmal; mesoscutellum with five pairs of bristles on either side; apex of hindwing blunt, fringe as posterior margin one-third as wide as wing at hamuli. Surface of propodeum almost smooth, paraspiracular carinae absent; mesoscutellum five times as long as propodeum at meson; gaster long, slender, more than twice as long as thorax, and clothed with long bristles laterally and ventrally.

Male.—Length, 1.5 mm. Scape with small darkened anterior carina near apex; pedicel narrow, but as long as first funicle segment, second segment one and one-half times as long as first, three distal segments each of the same length, fourth segment one-half as long as club; funicle segments bearing conspicuously long bristles on enlargements near bases; submarginal vein with four dorsal bristles; mesoscutellum only two and one-half times as long as propodeum at meson; gaster sparsely clothed with bristles and only slightly longer than thorax.

Type locality.—Ames, Iowa.

Types.—U.S.N.M. No. 56248.

Described from the female holotype, male allotype, and 1 female paratype, collected at Ames, Iowa, August 28, 1927. An additional single female specimen, not included in the type series, was collected at Arlington, Va. This last-mentioned specimen is in very poor condition.

TETRASTICHUS PHEGUS, new species

Iridescent green or blue-green, with a distinct purplish cast, especially on pronotum, scapulae, pleurae, and sternae; antennal scape, ventral side of pedicel, bases and apices of femora, usually most of tibiae, and basal three segments of middle and hind tarsi light yellow or white; antennal flagellum, area of head around mouthparts, variable, poorly defined areas near bases of tibiae, front tarsi, and apical segment of middle and hind tarsi tan or light brown.

Female.—Length, 1.9–2.1 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; apex of scape reaching level of margin of anterior ocellus; pedicel and first and third funicle segments each of the same length, second funicle segment slightly longer, club twice as long as third funicle segment; length of malar space two-thirds as great as height of compound eye; postocellar line twice as long as ocellocular; area of frons laterad and dorsad of scrobe cavity with numerous short, erect bristles. Mesopraescutum with two or three rather irregular rows of bristles at

each lateral margin; submarginal vein of forewing with four or five dorsal bristles, marginal vein twice as long as stigmal; mesoscutellum with four bristles on either side, these bristles usually arranged in a straight row and evenly spaced, but sometimes rather irregular; apex of hindwing blunt, fringe at posterior margin one-sixth to one-seventh as wide as wing at hamuli. Surface of propodeum shagreened anteriorly, more smooth posteriorly, median, paraspiracular, and oblique carinae present, as in figure 21, *d*; spiracles almost contiguous with anterior margin of propodeum; length of mesoscutellum three and one-half times as great as median length of propodeum; gaster one and one-third times as long as thorax.

Male.—Length, 1.5 mm. Darkened anterior carina of scape three-fourths as long as scape; pedicel and each segment of funicle equal in length, club twice as long as fourth funicle segment; funicle segments semiquadrate, and without long bristles; gaster as long as thorax.

Type locality.—Victoria, Tex.

Types.—U.S.N.M. No. 56249.

Described from 25 female and 2 male specimens, as follows: Female holotype, male allotype, and 1 male and 10 female paratypes from the type locality, reared from *Disholcaspis cinerosa* (Bassett) gall on live oak (*Quercus chrysolepis*), July 1–August 6, 1909, J. D. Mitchell; 4 female paratypes, Kern County, Calif., reared from gall of *Heterococcus pacificus* Ashmead, June 30, 1893, under Bureau of Entomology No. 5542; and 10 female paratypes from Oneida, Ill., reared from gall of *Disholcaspis mamma* (Walsh), July 12, 1893, under Bureau of Entomology No. 5724⁰².

TETRASTICHUS GIGAS, new species

Iridescent green or blue-green, sometimes very dark, almost black, but always with at least a distinct, iridescent sheen, especially at meson of thoracic notum; usually base and anterior side of antennal scape, apices of femora, bases and apices of tibiae, and basal segment of middle and hind tarsi light yellow or white; darkened parts of tibiae and tarsi usually tan or brown, lighter than dark parts of femora; pronotum usually with a faint iridescent bluish or purplish cast.

Female.—Length, 3.0–4.0 mm. Antennae inserted slightly ventrad of level of ventral margin of compound eyes; apex of scape reaching level of dorsal margin of anterior ocellus; pedicel and each funicle segment equal in length, club slightly shorter than two funicle segments combined; length of malar space slightly greater than height of compound eye; postocellar line one and one-half times as long as ocellocular; area of frons dorsad and laterad of scrobe cavity set with numerous short, erect bristles, area immediately ventrad of antennal

bases with minute, closely set transverse reticulations. Mesopraescutum with two or three irregular rows of bristles at each lateral margin; submarginal vein of forewing with four or five dorsal bristles, marginal vein twice as long as stigmal, latter usually weak near base; mesoscutellum bearing three pairs of bristles; apex of hindwing blunt, fringe at posterior margin one-seventh to one-eighth as wide as wing at hamuli. Surface of propodeum shagreened, paraspircular carinae present; mesal length of mesoscutellum three and one-half times as great as mesal length of propodeum; spiracles separated from anterior margin of propodeum by a space one-half as great as length of a spiracle; gaster narrow, elongate, twice as long as thorax.

Male.—Length, 2.0–3.0 mm. Darkened anterior carina of scape one-half as long as scape; pedicel slightly longer than first funicle segment, first and second segments equal in length, third and fourth equal in length and each slightly longer than second; club two and one-half times as long as fourth funicle segment; segments of antennal flagellum without long bristles; gaster one and one-half times as long as thorax.

Type locality.—Stanford University, Palo Alto, Calif.

Types.—U.S.N.M. No. 56250.

Described from 47 female and 39 male specimens. Holotype female, allotype male, and 8 female and 1 male paratypes from the type locality, reared from gall of *Andricus californicus* Bassett, February 19, 1932, F. H. Sumner; 1 female paratype and 1 male paratype, Oregon Mountain, Josephine County, Oreg., reared from gall of *Andricus californicus*, November 17, 1927, H. A. Scullen; and the following paratypes, all reared from *Andricus californicus* by S. M. Dohanian, April 6–7, 1939: 4 females, 4 males, Sacramento, Calif.; 4 females, 4 males, Washington County, Oreg.; 4 females, 4 males, Benton County, Oreg.; 8 females, 8 males, Marion County, Oreg.; 8 females, 8 males, Eugene and vicinity, Oreg.; 4 females, 4 males, Polk County, Oreg.; and 4 females, 4 males, Clark County, Wash.

TETRASTICHUS HOLBEINI Girault

Tetrastichus holbeini GIRAULT, New chalcid flies, p. 2, 1917.

Very dark brown or black with green or blue-green iridescence; antennae, apices of femora, tibiae, and basal segments of tarsi light yellow or white.

Female.—Length, 2.0 mm. Antennae inserted ventrad of level of ventral margins of compound eyes; apex of scape not quite reaching level of anterior ocellus; pedicel and first funicle segment equal in length, second and third segments equal in length and each four-fifths as long as first; club as long as first and second funicle segments; length of malar space four-fifths as great as height of compound eye. Mesopraescutum as long as wide and bearing one or two rows of bristles at

each lateral margin; submarginal vein of forewing with five or six dorsal bristles; marginal vein three and one-half times as long as stigmal vein; prepectus reticulated, rest of mesopleuron almost smooth; apex of hindwing blunt, width of fringe at posterior margin one-fifth as great as width of wing at hamuli. Surface of propodeum very faintly reticulated, almost smooth; median carina almost entirely obliterated, paraspiracular carinae wanting; mesal length of propodeum one-fifth as long as mesoscutellum; propodeal spiracles separated from anterior margin by a space almost as great as length of a spiracle; gaster twice as long as thorax.

Male.—Length, 1.4 mm. Darkened anterior carina of scape one-half as long as scape; all four funicle segments equal in length and each three-fourths as long as pedicel; segments of funicle approximately quadrate and bearing relatively short setae; gaster one-third longer than thorax.

Type locality.—Yreka, Calif.

Types.—U.S.N.M. No. 21064.

Hosts.—The Pacific flathead borer, *Chrysobothris mali* Horn, in *Platanus racemosus*; the flat-headed apple tree borer, *Chrysobothris femorata* Olivier; *Chrysobothris* spp. in various trees.

Distribution.—California, Missouri, West Virginia.

TETRASTICHUS MODESTUS Howard

Tetrastichus modestus HOWARD, in Scudder, Butterflies of Eastern United States, p. 1894, 1889.—VIERECK, Connecticut State Geol. and Nat. Hist. Surv. Bull. 22, p. 453, 1916.

Epitetrastichus mundicornis GIRAULT, Chalcidoidea nova Marilandensis, pt. 3, p. 1, 1917. (New synonymy.)

Dark brown or black; apices of femora and tibiae, and three proximal segments of tarsi white; antennae may be partly or entirely yellowish.

Female.—Length, 0.8–1.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching a point considerably below level of anterior ocellus, pedicel one and three-quarters times as long as first funicle segment, second and third segments equal and each slightly longer than first, club as long as funicle; malar space two-thirds height of compound eye; postocellar line two and one-half times as long as ocellular. Mesothoracic spiracles oval, only partly concealed by projecting angle of pronotum; mesopraescutum slightly wider than long, surface entirely covered by long bristles; submarginal vein of forewing with two or three dorsal bristles; marginal vein three times as long as stigmal; hindwing blunt at apex, marginal fringe one-third width of wing at hamuli; anterior pair of scutellar bristles conspicuously long and located

near anterior margin of segment. Surface of propodeum smooth, median carina only present; mesal length of propodeum one-third length of mesoscutellum; propodeal spiracle round, minute, separated from anterior margin by a space equal to diameter of a spiracle; gaster equal in length to thorax.

Male.—Length, 0.8 mm. Scape broadened from base to apex and bearing a long, darkened anterior carina; funicle segments semi-quadrated and without long bristles, club two and one-half times as long as fourth funicle segment.

Type locality.—Coalburg, W. Va.

Types.—U.S.N.M. No. 2677. (Specimens in poor condition.)

Hosts.—*Apanteles atalantae* (Packard) parasitic on the red admiral butterfly, *Vanessa atalanta* (Linnaeus), and *Apanteles* sp. parasitic on the semicolon butterfly, *Polygonia interrogationis* (Fabricius); *Apanteles* sp. parasitic on the grape leaf folder, *Desmia funeralis* Huebner.

Distribution.—Iowa, Maryland, Ohio, Virginia, West Virginia.

TETRASTICHUS PATTERSONAE Fullaway

FIGURE 16, c

Tetrastichus pattersonae FULLAWAY, Journ. New York Ent. Soc., vol. 20, p. 280, 1912.

Bright, iridescent green or blue-green; antennae, trochanters, apices of femora, tibiae, and basal segments of tarsi light yellow or white.

Female.—Length, 1.9–2.2 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus; funicle segments globular, second and third segments equal and each slightly shorter than first, all funicle segments equal in width; club as long as first and second funicle segments combined; length of malar space two-thirds height of compound eye; malar furrow forming a triangle with ocular suture just ventrad of compound eye (fig. 16, c), ocellocular line two-thirds as long as postocellar. Mesopraescutum wider than long, entire surface densely covered by bristles, as in figure 19, c; submarginal vein of forewing with five or six dorsal bristles; surface of entire mesopleuron reticulated; apex of hindwing blunt, fringe at posterior margin one-ninth width of wing at hamuli; longitudinal grooves of mesoscutellum sometimes vague. Surface of propodeum lightly shagreened, paraspiracular carinae absent, mesal length of propodeum one-third length of mesoscutellum, propodeal spiracles almost touching anterior margin, one pair of submesal bristles usually present at posterior margin of propodeum; gaster one-fourth longer than thorax.

Male.—Length, 1.8–2.0 mm. First funicle segment three-fifths as long as pedicel, second to fourth funicle segments equal in length and

each as long as pedicel, funicle segments elongate, enlarged near bases, and with bristles slightly longer than the segments, club slightly longer than scape; gaster equal in length to thorax.

Type locality.—California.

Types.—The types cannot now be found and are probably lost; they were originally supposed to be in the collection at Stanford University and were labeled L. S. J. U., Lot 508, s. 19.

Hosts.—*Diplolepis echina* (Osten Sacken); *Callirhytis pomiformis* (Bassett); (?) *Disholcaspis chrysolepidis* (Beutenmüller).

Distribution.—California, Florida, Utah.

TETRASTICHUS SPILOPTERIS, new species

FIGURE 16, b

Bright, iridescent green, occasionally becoming dark purple or almost black; antennae, all of coxae except bases, trochanters, most or all of femora, tibiae, and basal segments of tarsi white or light yellow; male with a conspicuous patch of dark setae in forewing near apex.

Female.—Length, 1.0–2.2 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eye; apex of scape not quite reaching level of anterior ocellus; first funicle segment two-thirds as long as pedicel, second segment four-fifths as long as first, third three-fourths as long as second, club short, globose, twice as long as second funicle segment; length of malar space one-half height of compound eye; malar furrow straight; length of postocellar line twice as great as ocellular. Mesopraescutum slightly wider than long and its entire surface densely covered with bristles, as in figure 19, *e*; submarginal vein of forewing with two or three dorsal bristles; marginal vein three and one-half times as long as stigmal; apex of hindwing blunt, fringe at posterior margin one-sixth as wide as wing at hamuli. Surface of propodeum faintly reticulated, almost smooth, paraspircular carinae wanting, mesal length of propodeum one-third length of mesoscutellum, propodeal spiracles contiguous with anterior margin; gaster one and one-half times as long as thorax.

Male.—Length, 1.1–1.5 mm. Scape twice as long as pedicel, first funicle segment four-fifths as long as pedicel, second segment equal to first, third three-fourths as long as second, fourth one-sixth shorter than third, funicle segments without conspicuously long bristles, club three times as long as fourth funicle segment; gaster as long as thorax.

Type locality.—Berkeley, Calif.

Types.—U.S.N.M. No. 56251.

Described from 11 female and 15 male specimens, as follows: From the above locality, holotype, female, and allotype, male, September

18, 1921, reared from gall of *Neuroterus saltatorius* (Riley), C. T. Dodds; 1 female paratype reared from gall of *Andricus kingi* Bassett, C. T. Dodds; and 1 male paratype collected May 26, 1907; also, 6 female and 7 male paratypes from Los Altos, Calif., May 18, 1922, E. O. Essig; 1 female and 3 male paratypes, Beaverton, Oreg., June 1, 1934, reared from an undetermined gall on *Quercus garryana*, under Hopkins U. S. No. 20559a; 2 female and 2 male paratypes, Los Angeles, Calif., reared from gall of *Callirhytis bicornis* McCracken and Egbert, April 1940, R. H. Smith; and an additional single male paratype was collected at Mesilla, N. Mex., May 31, 1938, by Christenson and Clancy, and bears the number C-9504.

TETRASTICHUS VERRUCARII Balduf

FIGURE 19, *e*

Tetrastichus verrucarii BALDUF, Can. Ent., vol. 61, pp. 125, 221, 1929.

Dull, dark brown, occasionally with very faint iridescent reflections; antennae sometimes, apices of femora, tibiae, and basal segments of tarsi white; abdomen of male may be white at base.

Female.—Length, 1.3–1.6 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not quite reaching anterior ocellus, first funicle segment one-sixth longer than second, second and third segments equal in length, club two and one-half times as long as first funicle segment; malar space one-half height of compound eye; malar furrow straight; postocellar line twice as long as ocellocular. Mesothoracic spiracle only partly covered by minute emarginate flange; mesopraescutum slightly wider than long and surface completely covered with bristles (fig. 19, *e*); submarginal vein of forewing with three to five dorsal bristles, marginal vein three and one-half to four times as long as stigmal; apex of hindwing blunt, fringe at posterior margin one-fifth width of wing at hamuli. Propodeum very faintly reticulated, almost smooth, median carina only present; mesal length of propodeum one-fourth length of mesoscutellum; propodeal spiracles contiguous with anterior margin; gaster equal to or only slightly longer than thorax.

Male.—Length, 1.0–1.4 mm. Antennal scape with darkened anterior carina two-thirds as long as scape; pedicel and first funicle segment equal in length, second, third, and fourth equal and each one-quarter longer than first, setae slightly longer than segments borne on dorsal elevations near bases of segments, club as long as pedicel and first two funicle segments; postocellar line three times as long as ocellocular. Gaster as long as thorax.

Type locality.—Urbana, Ill.

Types.—U.S.N.M. No. 40986.

Hosts.—Oak-leaf galls. *Neuroterus verrucarum* (Osten Sacken), *N. niger* Gillette, *N. varians* Kinsey, *N. floccosus* (Bassett).

Distribution.—California, District of Columbia, Illinois, New York, Virginia.

TETRASTICHUS CARPATUS, new species

Varying from very dark brown with iridescent bluish cast to black with iridescent blue-green luster; antennal flagellum, apices of femora, bases and apices of tibiae, and basal segments of tarsi yellow or white; apex of antennal pedicel lighter in color than base; males usually considerably lighter than females.

Female.—Length, 1.1–1.6 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; scape short, its apex not reaching level of ventral margin of anterior ocellus; pedicel conspicuously enlarged at apex; first funicle segment one-sixth shorter than pedicel, second and third segments wider than first and each shorter than first, club as long as pedicel and first funicle segment; length of malar space three-fourths height of compound eye, malar furrow gently curved, almost straight; length of postocellar line four times as great as ocellular. Mesopraescutum slightly wider than long and bearing three sometimes irregular rows of bristles at each lateral margin, each row usually consisting of but three to five bristles, and sometimes only two bristles present in a row; submarginal vein of forewing with two dorsal bristles; apex of hindwing blunt, fringe at posterior margin slightly less than one-fourth as wide as wing at hamuli. Propodeum lightly shagreened, vague paraspiracular carinae present; propodeal spiracles round, mesal length of propodeum one-third dorsal length of mesoscutellum; gaster elongate, acuminate, from one and two-thirds to two times as long as thorax.

Male.—Length, 0.8–1.3 mm. Scape broadened from near base to apex, pedicel globose, one-fifth longer than first funicle segment, all funicle segments beadlike, approximately equal in length, with first segment slightly narrower than fourth, conspicuously long setae absent, club one-sixth shorter than three funicle segments; gaster slightly longer than thorax.

Type locality.—Monrovia, Calif.

Types.—U.S.N.M. No. 56252.

Described from 105 female and 9 male specimens. Female holotype, male allotype, and 66 female and 4 male paratypes, from the type locality, reared from *Apanteles carpatus* (Say), Wm. Moore; 13 female paratypes, Columbus, Ohio, reared from clothes moths in 1934, H. C. Mason; 4 female paratypes, Columbus, Ohio, reared from *Tincola biselliella* Hummel, November 24, 1931, H. C. Mason; 6 female and 3 male paratypes, Silver Spring, Md., August 1931, from *Tinca pellionella* Linnaeus, W. Colman; 1 male and 9 female para-

types, Silver Spring, Md., April 6, 1933, reared from clothes moths, W. S. Abbott; and 6 female paratypes, St. Louis, Mo., reared from *Tinea fuscipunctella* Haworth, P. Rau.

Remarks.—This species is most likely always a parasite of *Apanteles carpatus* (Say), and thus a secondary parasite of clothes moths, although sometimes it has been said to have come from clothes moths themselves. *Tinea fuscipunctella* Haworth, from which some specimens were said to have been reared, is not a clothes moth but ordinarily develops in bird nests. Occasionally *T. fuscipunctella* is, however, a pest in carpets and other articles of wool in houses and thus is undoubtedly subject to attack by the same parasites as are the true clothes moths. The male of this parasite evidently is quite rare.

TETRASTICHUS HUNTERI Crawford

FIGURE 19, *d*

Tetrastichus hunteri CRAWFORD, Proc. Ent. Soc. Washington, vol. 11, p. 150, 1909.—PIERCE, U. S. Bur. Ent. Bull. 100, p. 52, 1912.—HUNTER and PIERCE, U. S. Bur. Ent. Bull. 114, p. 142, 1912.

Iridescent blue-green, sometimes with a slight purple tinge; antennal flagellum, coxae, all but apices and bases of femora and tibiae, front tarsi and apical segments of middle and hind tarsi brown or black; scape, apices and bases of femora and tibiae and basal segments of middle and hind tarsi yellow; abdomen brown or tan at base.

Female.—Length, 1.8–2.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not quite reaching level of anterior ocellus, first funicle segment as long as pedicel, second slightly longer than first, third as long as first, club as long as two apical funicle segments; length of malar space two-thirds height of compound eye; postocellar line twice as long as ocellular. Mesopraescutum slightly wider than long and bearing three rows of bristles at each lateral margin; submarginal vein of forewing with four or five dorsal bristles; marginal vein three times as long as stigmal, mesoscutellum usually with six bristles; apex of hindwing blunt, fringe at posterior margin one-fifth width of wing at hamuli. Propodeum shagreened and both median and paraspiracular carinae present; mesal length of propodeum one-fourth length of mesoscutellum; propodeal spiracles separated from anterior margin by a space equal to diameter of a spiracle; gaster slightly longer than thorax.

Male.—Unknown.

Type locality.—Natchez, Miss.

Types.—U.S.N.M. No. 12677.

Host.—Larvae of the cotton boll weevil, *Anthonomus grandis* Boheman.

Distribution.—Louisiana, Mississippi, Texas. (Probably occurs wherever cotton is grown.)

TETRASTICHUS TURIONUM (Hartig)

Eulophus turionum HARTIG, Jahresb. Fortschr. Forstw., vol. 1, p. 263, 1833.—

RATZBURG, Die Ichneumoniden der Forstinsecten . . . , vol. 1, p. 168, 1844.

Entedon turionum (Hartig) RATZBURG, Die Ichneumoniden der Forstinsecten . . . , vol. 2, p. 170, 1848; vol. 3, p. 214, 1852.

Tetrastichus turionum (Hartig) DOWDEN, Ann. Ent. Soc. Amer., vol. 27, p. 602, 1934.—BERGOLD and RIPPER, Zeitschr. für Parasitenk., vol. 9, p. 415, 1937.—

DOWDEN and BERRY, Journ. Econ. Ent., vol. 31, p. 459, 1938.

Iridescent blue-green; antennae brown; trochanters, apices of femora, usually tibiae, and tarsi light yellow or white.

Female.—Length, 1.1–2.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not reaching level of anterior ocellus, all funicle segments equal in length and each as long as pedicel, third funicle segment slightly constricted at base, club as long as two funicle segments; malar space three-fifths height of compound eye; mesopraescutum wider than long and each lateral margin bearing three rows of bristles, mesal row on each side may be irregular; submarginal vein of forewing with three or four dorsal bristles; apex of hindwing blunt, fringe at posterior margin one-fifth width of wing at hamuli. Surface of propodeum smooth, median carina vague; mesal length of propodeum one-fifth length of mesoscutellum; propodeal spiracles not quite touching anterior margin; gaster varying from one and three-quarters to twice as long as thorax.

Male.—Length, 1.0–1.4 mm. Scape thickened and with a long anterior carina, all funicle segments equal in length and each equal to pedicel, funicle segments slightly enlarged near bases, and bearing setae as long as the segments, club slightly longer than two apical funicle segments.

Type locality.—Germany.

Types.—Possibly in Munich, Germany.

Host.—*Rhyacionia buoliana* (Schiffermüller), the European pine shoot moth.

Distribution.—Massachusetts, New York; western and central Europe.

TETRASTICHUS CAERULESCENS Ashmead

FIGURE 19, b

Tetrastichus caeruleseens ASHMEAD, Proc. Ent. Soc. Washington, vol. 4, p. 130, 1897.—VIERECK, Connecticut State Geol. and Nat. Hist. Survey Bull. 22, p. 455, 1916.—FRISON, Bull. Illinois Nat. Hist. Survey, vol. 16, p. 223, 1927.

Tetrastichus doteni CRAWFORD, Proc. Ent. Soc. Washington, vol. 13, p. 234, 1911.
(New synonymy.)

Iridescent blue-green; scape sometimes, apices of femora, bases and apices of tibiae, and basal segments of tarsi light yellow or white; darkened areas of tibiae sometimes lighter than dark parts of femora, but generally they are the same color; mesal lobe of metanotum slightly lighter than dorsum of thorax.

Female.—Length, 1.6–1.8 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of ventral margin of anterior ocellus; pedicel and first funicle segment equal in length, second and third segments equal and each slightly shorter than first, club as long as pedicel and first funicle segment; length of malar space one-half as great as height of compound eye; postocellar line three times as long as ocellocular. Mesopraescutum as long as wide and bearing three or four rows of bristles at each lateral margin, meson always bare (fig. 19, *b*); submarginal vein of forewing with four or five dorsal bristles; stigmal vein long, slightly more than one-half as long as marginal; hindwing blunt at apex, fringe at posterior margin one-fourth as wide as wing at hamuli. Surface of propodeum very faintly reticulated, almost smooth, paraspiracular carinae wanting, mesal length of propodeum one-fifth as great as length of mesoscutellum; spiracles almost contiguous with anterior margin of propodeum; gaster one and one-half times as long as thorax.

Male.—Length 1.5 mm. Darkened anterior carina of scape one-half as long as scape; funicle segments semiquadrate and bearing setae only as long as the segments; first segment three-fourths as long as second; gaster and thorax equal in length; apex of ninth tergite acute, rather than blunt.

Type locality.—Urbana, Ill.

Types.—Holotype and allotype in Illinois Natural History Survey collection.

Hosts.—*Microbracon gelechiae* (Ashmead), parasitic on *Canarsia hammondi* Riley; *Microbracon* sp. and *Apanteles* sp. parasitic on various Coleoptera and Lepidoptera. Specimens have been reared, apparently as primary parasites, from *Coleophora malivorella* Riley and an unidentified lepidopterous miner on arborvitae (probably *Argyresthia thuicella* (Packard) or *Recurvaria thujaella* Kearfott). A series was also reared from the cocoons of a coniopterygid, *Malacomyza* (*Aleu-ronia*) *westwoodi* (Fitch); another series was reared from the heads of bush clover (*Lespedeza*) infested with *Apion* sp. (probably *A. decoloratum* Smith) and an unidentified bruchid. The specimens of *T. caerulescens* in this case, however, probably emerged from the cocoons of some *Microgaster* parasitic on the weevils. The same may

be true of a series said to have been reared from *Tychius lineellus* LeConte in the seed heads of *Lupinus*.

Distribution.—Arkansas, California, Colorado, Delaware, District of Columbia, Georgia, Illinois, Kansas, Maine, Maryland, Nevada, New Brunswick, Pennsylvania, Texas, Virginia, West Virginia.

TETRASTICHUS DOLOSUS Gahan

Tetrastichus dolosus GAHAN, Proc. U. S. Nat. Mus., vol. 53, p. 215, 1917.

Very dark, iridescent blue-green; head, antennae, coxae, and basal parts of femora brown; tibiae and tarsi light yellow or white.

Female.—Length, 1.25–1.35 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not reaching anterior ocellus; all funicle segments equal in length and each as long as pedicel, and as wide as long, club as long as scape; length of malar space one-half as great as height of compound eye; postocellar line three times as long as ocellocular. Mesopraescutum as wide as long, surface almost entirely covered with bristles, bare only on meson, so that there are four or five rows of bristles at each lateral margin; submarginal vein of forewing with three or four dorsal bristles; marginal vein twice as long as stigmal; apex of hindwing blunt, fringe at posterior margin one-quarter width of wing at hamuli. Surface of propodeum almost smooth, slightly roughened; paraspiracular carinae absent; mesal length of propodeum one-third length of mesoscutellum; propodeal spiracles separated from anterior margin by a space equal to diameter of a spiracle; gaster as long as thorax.

Male.—Length, 1.1 mm. Scape broadened, its darkened anterior carina three-eighths as long as scape, pedicel and all funicle segments equal in length, funicle segments nearly quadrate and without long setae, club as long as three funicle segments.

Type locality.—Tallulah, La.

Types.—U.S.N.M. No. 20395.

Hosts.—*Euplectrus comstockii* Howard parasitic on *Caradrina* sp.; *Euplectrus* sp. parasitic on larvae of the spring cankerworm, *Paleacrita vernata* (Peck); *Euplectrus plathypenae* Howard parasitic on larvae of the green clover worm, *Plathypena scabra* (Fabricius) and other Lepidoptera. Specimens were also reared, possibly as primary parasites, from the strawberry leaf roller, *Ancylis comptana* (Froelich), and *Fascista cercerisella* (Chambers).

Distribution.—Kansas, Louisiana.

TETRASTICHUS STROBILUS, new species

Head and thorax black, with strong iridescent bluish luster; antennal flagellum, area of head around mouthparts, metanotum, small area at

base of gaster, darkened area on femora, entire front tarsi, and apical segment of middle and hind tarsi brown; usually entire scape, pedicel and ventral side of first funicle segment of antenna, inner triangular part of scapulae, bases and apices of femora, usually entire tibiae, and basal three segments of middle and hind tarsi light yellow or white. Inner side of tibiae, dorsal line on scape, and basal area of pedicel may be somewhat darkened.

Female.—Length, 1.5–2.2 mm. Area of frons dorsad and laterad of scrobe cavity deeply punctured; area immediately ventrad of antennal bases shagreened; fracture at ventral margin of compound eye obscure, small; antennae inserted slightly dorsad of level of ventral margins of compound eyes, apex of scape reaching level of ventral margin of anterior ocellus; pedicel and first funicle segment equal in length, second segment slightly shorter than first and third slightly shorter than second, club one and one-half times as long as first funicle segment, length of malar space one-half as great as height of compound eye; postocellar line one and one-half times as long as ocellocular line. Mesopraescutum bearing one row of bristles at each lateral margin; submarginal vein of forewing bearing three or four dorsal bristles, submarginal vein three and one-half times as long as stigmal vein; posterior scutellar bristles located slightly nearer lateral margin of sclerite than are anterior scutellars; apex of hindwing blunt, fringe at posterior margin one-fifth as great as width of wing at hamuli. Surface of propodeum very faintly reticulated, almost smooth, paraspiracular carinae wanting, postspiracular carinae obscure; spiracles contiguous with anterior margin of propodeum; gaster one and two-thirds to almost twice as long as thorax.

Male.—Length, 1.5–1.9 mm. Scape with short darkened anterior carina near apex; pedicel globose, slightly longer than first funicle segment. Second segment one and two-thirds times as long as first, third and fourth equal in length and each one and one-fourth times as long as second, club slightly longer than two apical funicle segments combined; funicle segments bearing conspicuously long bristles on enlargements near bases of segments; marginal vein three times as long as stigmal; gaster as long as or slightly longer than thorax.

Type locality.—Jenny Creek, Oreg.

Types.—U.S.N.M. No. 56253.

Described from the female holotype, male allotype, and 8 female and 7 male paratypes reared from an unidentified lepidopteron in the cones of Douglas fir, *Pseudotsuga taxifolia*, during 1938–1939, by J. E. Patterson, under Hopkins U. S. No. 32333–C.

Host.—The host of this species probably is *Barbara colfaxiana* (Kearfott).

TETRASTICHUS SOBRIUS Gahan

Tetrastichus sobrius GAHAN, Ann. Ent. Soc. Amer., vol. 12, p. 166, 1919.

Body brown or black; antennae, apices of femora, tibiae and basal segments of tarsi light yellow or white; abdomen of male white at base.

Female.—Length, 1.5–2.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of antennal scape reaching level of ventral margin of anterior ocellus; first funicle segment slightly longer than pedicel, second equal to pedicel in length, third slightly shorter, each segment slightly wider than the one proximad of it, club as long as second and third funicle segments combined; ocellocular line one-half as long as postocellar. Mesopraescutum as wide as long and bearing two rows of bristles at each lateral margin; submarginal vein of forewing with three or four dorsal bristles, marginal vein six times as long as stigmal; both pairs of scutellar bristles located posterior to middle of segment. Apex of hindwing blunt, fringe at posterior margin one-fifth width of wing at hamuli. Surface of propodeum slightly roughened, both median and paraspicular carinae present; mesal length of propodeum one-sixth length of mesoscutellum; propodeal spiracles touching anterior margin, length of spiracle equal to mesal length of propodeum; gaster long, narrow, and acutely pointed, twice as long as thorax.

Male.—Length, 1.0–1.25 mm. Scape broad and bearing a short, darkened anterior carina near apex, first funicle segment two-thirds as long as pedicel, second segment twice as long as first, third and fourth equal and each slightly longer than second, conspicuously long setae borne on transverse dorsal elevations near bases of segments; club as long as third and fourth funicle segments; gaster slightly shorter than thorax.

Type locality.—Tempe, Ariz.

Types.—U.S.N.M. No. 22300.

Hosts.—Originally said to be a parasite of the alfalfa gall midge, *Asphondylia websteri* Felt; additional material was reared from flower galls on *Senecio douglassi*, probably made by *Asphondylia bea* Felt.

Distribution.—Arizona, California; Russia.

Remarks.—Specimens of a species of *Tetrastichus* reared from alfalfa in Russia were found to be the same as this species; European authors may have referred to this species under some other name.

TETRASTICHUS PUNCTATIFRONS (Girault), new combination

FIGURES 17, c; 19, a; 21, b

Epitetrastichus punctatifrons GIRAULT, Proc. U. S. Nat. Mus. vol. 51, p. 128, 1916.

Body black or very dark brown, with metallic-green reflections; head metallic blue-green or purple; antennae, bases and apices of femora and tibiae, and basal segments of tarsi white, light yellow, or tan; color of metatibiae variable; abdomen paler brown at base; all setae borne by head and body set in conspicuous pits.

Female.—Length, 2.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of ventral margins of anterior ocellus; scape two and one-half times as long as pedicel, first funicle segment slightly shorter than pedicel, second equal to pedicel, third as long as first, club as long as second and third funicle segments combined; malar space two-thirds height of compound eye; postocellar line twice as long as ocellular. Mesopraescutum wider than long, two rows of bristles present at each lateral margin, bristles arising from conspicuous pits (fig. 19, *a*); median groove slightly broadened posteriorly; submarginal vein of forewing with three to five dorsal bristles; apex of hindwing blunt, width of fringe at posterior margin one-fourth as great as width of wing at hamuli; metacoxae deeply pitted. Surface of propodeum shagreened (fig. 21, *b*); mesal length two-fifths as great as length of mesoscutellum; both median and lateral carinae present; propodeal spiracles contiguous with anterior margin; gaster slightly longer than thorax.

Male.—Length, 1.6–1.8 mm. Scape bearing a short darkened carina near apex, first funicle segment two-thirds as long as pedicel, second almost twice as long as first, third and fourth each one-third longer than second, funicle segments elongate, enlarged near bases, and bearing conspicuously long setae, club as long as three apical funicle segments; gaster slightly longer than thorax.

Type locality.—Tempe, Ariz.

Types.—U.S.N.M. No. 19644.

Host.—Leaf miner in cottonwood (*Populus*), probably *Paraleucoptera albella* (Chambers).

Distribution.—Arizona.

TETRASTICHUS BANKSII Howard

Tetrastichus banksii HOWARD, Proc. Ent. Soc. Washington, vol. 2, p. 209, 1892.

Body brown; scape of antennae, apices of femora, tibiae, and tarsi light yellow or white.

Female.—Length, 1.9 mm. Frons strongly punctured laterad of scrobe cavity; antennae inserted at level of ventral margins of compound eyes; apex of scape not quite reaching level of anterior ocellus; first and second funicle segments equal in length; third segment slightly shorter than second, club as long as pedicel and first funicle segment; length of malar space two-thirds height of compound eye;

ocellocular line two-thirds as long as postocellar. Prepectus much more strongly reticulated than rest of mesopleuron; mesopraescutum wider than long and bearing one row of bristles at each lateral margin, these bristles set in conspicuous pits; submarginal vein of forewing with two or three dorsal bristles; apex of hindwing blunt, fringe at posterior margin one-fourth width of wing at hamuli. Propodeum shagreened and bearing median, paraspircular, and oblique carinae, as in figure 21, *d*; propodeal spiracles almost touching anterior margin; gaster one-fourth longer than thorax.

Male.—Unknown.

Type locality.—Washington, D. C.

Types.—U.S.N.M. No. 2688.

Host.—This species is a primary or secondary parasite of argiopid spiders, issuing from the egg sacs.

Distribution.—District of Columbia, Florida.

TETRASTICHUS GIBBONI (Girault), new combination

FIGURE 16, *g*

Ootetrastichus gibboni GIRAULT, Bull. Brooklyn Ent. Soc., vol. 12, p. 86, 1917.

Head and base of gaster white, yellow, or tan; thorax brown, with iridescent green reflections; apical part of gaster brown, legs (except bases of metacoxae and apical segments of tarsi) white.

Female.—Length, 1.3–1.6 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; apex of scape exceeding level of vertex, pedicel and flagellar segments slender, elongate; three ring segments discernible, first funicle segment one-third longer than pedicel, second and third equal in length and each two-thirds as long as first, club as long as second and third funicle segments combined (fig. 16, *g*); length of malar space three-fourths height of compound eye; postocellar line one and two-thirds times as long as ocellocular. Mesopraescutum slightly wider than long and bearing only two or three bristles at each lateral margin; submarginal vein of forewing with two dorsal bristles; hindwing acute at apex; fringe at posterior margin one-half width of wing at hamuli. Surface of propodeum smooth, bearing a median carina only; mesal length of propodeum one-third length of mesoscutellum; propodeal spiracles round, minute, separated from anterior margin by a space equal to diameter of a spiracle; minute petiole present, gaster twice as long as thorax.

Male.—Unknown.

Type locality.—Tempe, Ariz.

Types.—U.S.N.M. No. 20787.

Host.—Larvae of the clover stem borer, *Languria mozardi* (Latreille).

Distribution.—Arizona.

TETRASTICHUS POLYNEMAE Ashmead

FIGURE 20, *f*

Tetrastichus polynemae ASHMEAD, Ent. News, vol. 11, p. 616, 1900.

Aprostocetus polynemae (Ashmead) GIRAULT, Proc. U. S. Nat. Mus., vol. 51, p. 130, 1916 (not *Aprostocetus polynemae* Ashmead).

Ootetrastichus mymaridis GIRAULT, Proc. U. S. Nat. Mus., vol. 51, p. 130, 1916. (New synonymy.)

Bright, iridescent green; abdomen varying from brown to iridescent green; legs, except coxae, anterior tarsi, and apical segments of middle and hind tarsi white.

Female.—Length, 1.0–1.2 mm. Antennae inserted slightly dorsal of level of ventral margins of compound eyes; scape short, its apex not reaching level of ventral margin of anterior ocellus; first funicle segment one-third longer than pedicel, second and third segments equal and each slightly shorter than first; club as long as second and third funicle segments; length of malar space two-fifths height of compound eye; postocellar line equal in length to ocellocular. Mesopraescutum as long as wide and bearing two or three bristles at each lateral margin; submarginal vein of forewing with two or three bristles; apex of hindwing acute, width of fringe at hind margin equal to width of wing at hamuli; first bristle of hamuli one-half as long as width of wing (fig. 20, *f*). Surface of propodeum slightly reticulated; inconspicuous paraspiracular carinae present; propodeal spiracles minute, not quite contiguous with anterior margin; gaster one and one-half times as long as thorax.

Male.—Unknown.

Type locality.—Lake Forest, Ill.

Types.—U.S.N.M. No. 5323.

Host.—Eggs of damselfly, *Lestes* sp.

Distribution.—Delaware, Illinois.

TETRASTICHUS OECANTHIVORUS var. COMPAR Gahan

FIGURE 16, *e*

Tetrastichus oecanthivorus var. *compar* GAHAN, Ann. Ent. Soc. Amer., vol. 25, p. 743, 1932.

Thorax and apex of abdomen iridescent green; variable areas of head and antennae, tegulae, and dorsal sector of metapleuron, legs (except coxae of female), and base of gaster yellow; all tarsi light brown.

Female.—Length, 1.3–1.4 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of vertex, first funicle segment one and one-third times as long as second, second and third equal in length (fig. 16, *e*); club two and one-quarter times as long as third funicle segment; malar space one-half height of compound eye; postocellar line one-fourth longer than ocellocular. Meso-

praescutum slightly wider than long and bearing two bristles at each lateral margin; submarginal vein of forewing with two or three dorsal bristles; apex of hindwing acute, fringe at posterior margin two-thirds as wide as wing at hamuli. Propodeum very faintly sculptured, almost smooth, well-defined median carina present; mesal length of propodeum one-fifth length of mesoscutellum; propodeal spiracles minute, not quite touching anterior margin; gaster narrow, elongate, twice as long as thorax.

Male.—Length, 1.2–1.3 mm. Scape enormously enlarged, and lacking a darkened anterior carina; first funicle segment as long as pedicel, three apical funicle segments equal in length and each two-thirds as long as first, funicle segments nearly quadrate and without conspicuously long bristles, club as long as three distal funicle segments combined, gaster one-third longer than thorax.

Type localities.—Mount Holly Springs and Carlisle, Pa.

Types.—U.S.N.M. No. 43916.

Host.—Eggs of tree cricket, *Oecanthus* sp.

Distribution.—Pennsylvania, South Carolina, Texas.

Remarks.—This variety is only doubtfully distinct from the European form.

TETRASTICHUS VENUSTUS Gahan

Tetrastichus venustus GAHAN, Proc. U. S. Nat. Mus., vol. 48, p. 168, 1914.—URBAHNS, U. S. Dept. Agr. Bull. 812, p. 18, 1920.—NIKOL'SKAYA, Rev. Ent. U. S. S. R., vol. 25, p. 119, 1933.

Female yellow with variable greenish-brown iridescent spots; most of head, dorsum of pronotum, areas outlining sutures on dorsum of thorax, tegulae, prepectus, metanotum, apices of coxae, trochanters, femora (except variable areas near bases), basal segments of tarsi, and base and variable lateral areas of gaster yellow. Male usually almost entirely iridescent brownish green.

Female.—Length, 1.3–1.8 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of vertex; first funicle segment one-fifth longer than pedicel, second and third segments combined equal in length to club; length of malar space two-thirds as great as height of compound eye; postocellar line two and one-quarter times as long as ocellocular. Mesopraescutum as long as wide and bearing one row of bristles at each lateral margin; submarginal vein of forewing with three or four dorsal bristles, marginal vein three and one-half times as long as stigmal; apex of hindwing blunt, fringe at posterior margin one-fifth as wide as wing at hamuli. Surface of propodeum very faintly reticulated, paraspiracular carinae absent, mesal length of propodeum one-third as great as length of mesoscutellum, propodeal spiracles contiguous with anterior margin of propodeum; gaster one and three-fourths times as long as thorax.

Male.—Length, 1.3 mm. Pedicel one and two-fifths times as long as first funicle segment, second to fourth segments equal and each twice as long as first, conspicuously long bristles borne by funicle segments on dorsal elevations near bases, club as long as three apical funicle segments combined; interocellar line three times as long as ocellocular; gaster and thorax equal in length.

Type locality.—Corcoran, Calif.

Types.—U.S.N.M. No. 18339.

Hosts.—Probably the clover and alfalfa seed chalcid, *Bruchophagus funebris* (Howard), or the alfalfa gall midge, *Asphondylia websteri* Felt.

Distribution.—California, Indiana, Iowa; Russia.

Remarks.—This species may be a synonym of the European species, *T. brevicornis* (Panzer). Nikol'skaya²⁴ held the same opinion.

TETRASTICHUS XANTHOPS (Ratzeburg)

FIGURE 16, k

Eulophus xanthops RATZEBURG, Die Ichneumoniden der Forstinsecten, vol. 1, p. 170, 1844.

Entedon xanthops (Ratzeburg) RATZEBURG, Die Ichneumoniden der Forstinsecten, vol. 2, p. 170, 1848; vol. 3, p. 215, 1852.

Tetrastichus xanthops (Ratzeburg) THOMSON, Hymenoptera Scandinaviae, vol. 5, p. 287, 1878.—DOWDEN, U. S. Dept. Agr. Techn. Bull. 757, p. 32, 1941.

Geniocerus xanthops (Ratzeburg) KURDJUMOV, Russ. Ent. Obozr. (Rev. Russe Ent.), vol. 13, p. 248, 1913.

Body iridescent green; variable areas of frons and antennae, tegulae, and spot at dorsal margin of mesopleuron yellow; front coxae, and apices of middle and hind coxae, and remainder of all legs white; base of gaster usually white.

Female.—Length, 1.0–1.6 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; apex of scape reaching level of ventral margin of anterior ocellus, all three funicle segments equal in length and each slightly longer than pedicel, club two and one-half times as long as a funicle segment; malar space three-fifths height of compound eye; postocellar line twice as long as ocellocular. Mesopraescutum as wide as long and bearing two rows of bristles at each lateral margin, median groove vague; entire mesopleuron almost smooth; submarginal vein of forewing with four or five dorsal bristles; marginal vein five times as long as stigmal; apex of hindwing acute, fringe at posterior margin one-third width of wing at hamuli, mesoscutellum usually with six bristles. Surface of propodeum faintly reticulated, almost smooth, only a faint median carina present; mesal lengths of propodeum and postscutellum equal; propodeal spiracles minute, separated from anterior margin by a space equal to diameter

²⁴ Rev. Ent. U. S. S. R., vol. 25, p. 119, 1933.

of a spiracle; gaster blunted at apex and its length equal to that of thorax, apex of ovipositor forming a minute, pointed projection in otherwise blunt abdomen.

Male.—Length, 0.8 mm. First funicle segment slightly shorter than pedicel, three distal funicle segments equal in length and each twice as long as first segment, all funicle segments bearing conspicuously long bristles on dorsal elevations near bases, bristles borne by first segment as long as entire funicle; club two and one-quarter times as long as fourth funicle segment; gaster as long as thorax.

Type localities.—Sweden; Germany.

Types.—Presumably in the Forestry Academy in Eberswalde, Germany.

Hosts.—The European birch leaf miner, *Phyllotoma nemorata* (Fallen); the elm leaf miner, *Fenusa ulmi* (Sundevall); the apple flea weevil, *Orchestes pallicornis* Say; *Phanomeris phyllotomae* Muesebeck; *Chrysocharis* sp. Several other hosts mentioned in European literature.

Distribution.—Massachusetts, Ohio; northern, central, and western Europe.

Remarks.—This species should not be confused with *Tetrastichus xanthopus* (Nees), which parasitizes *Dendrolimus pini* (Linnaeus) in Europe.

TETRASTICHUS RACEMARIAE Ashmead

FIGURES 17, *f*; 21, *d*

Tetrastichus racemariae ASHMEAD, Trans. Amer. Ent. Soc., vol. 13, p. 134, 1886.—

CRESSON, Synopsis of families and genera of Hymenoptera of America north of Mexico, p. 245, 1887.—VIERECK, Connecticut State Geol. Nat. Hist. Survey Bull. 22, p. 453, 1916.

Tetrastichus californicus ASHMEAD, Proc. Amer. Ent. Soc., vol. 14, p. 203, 1887. (New synonymy.)

Hyperteles flocci ASHMEAD, Proc. Amer. Ent. Soc., vol. 14, p. 203, 1887. (New synonymy.)

Dark brown or black with varying degrees of metallic-green iridescence; antennae, trochanters sometimes, bases and apices of femora, tibiae usually, and basal segments of tarsi white or light yellow; color of metatibiae variable.

Female.—Length, 1.8–2.2 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; apex of scape reaching level of ventral margin of anterior ocellus; scape two and one-third times as long as pedicel, all funicle segments equal in length and each slightly longer than pedicel, club not quite twice as long as first funicle segment: malar space three-fifths height of compound eye; postocellar line two to two and one-half times as long as ocellular. Mesopraescutum wider than long and provided with two rows of bristles at each

lateral margin; submarginal vein of forewing with three or four dorsal bristles; apex of hindwing blunt, width of fringe at posterior margin one-seventh width of wing at hamuli. Surface of propodeum strongly shagreened; mesal length of propodeum one-third length of meso-scutellum; median, paraspircular, and oblique carinae usually present (fig. 21, *d*), oblique carinae sometimes obscure; propodeal spiracles almost contiguous with anterior margin, their diameters equal to one-half median length of propodeum; gaster one and one-half times as long as thorax.

Male.—Length, 1.5–2.0 mm. Scape bearing darkened carina near apex, first funicle segment one-third longer than pedicel; second, third, and fourth segments equal in length and each slightly shorter than first; funicle segments subquadrate, without conspicuously long bristles, club short, only as long as pedicel and first funicle segment combined; gaster as long as thorax.

Type locality.—Jacksonville, Fla.

Types.—U.S.N.M. No. 2488. (Male type specimens missing.)

Hosts.—Oak galls, *Amphibolips cineraceae* (Ashmead), *Amphibolips racemaria* (Ashmead), *Amphibolips prunus* (Walsh), *Callirhytis pomiformis* (Bassett), *Disholcaspis mamma* (Walsh), *Andricus lasius* Ashmead, *Andricus flocci* (Walsh), *Neuroterus batatus* (Fitch).

Distribution.—Apparently to be found over most of the United States.

TETRASTICHUS CORMUS, new species

FIGURES 16, *j*; 17, *g*; 21, *c*, *h*

Head and thorax minutely shagreened; dark iridescent blue-green; usually dorsal side of entire antenna, coxae, basal four-fifths of femora, central parts of middle and hind tibiae, apical segment of each tarsus, and gaster dull brown; ventral side of antennae, apices of femora, fore tibiae, apices and bases of middle and hind tibiae, and basal segments of tarsi light yellow; entire antennal flagellum may be yellow rather than brown dorsally.

Female.—Length, 2.0–2.5 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; apex of scape reaching level of ventral margin of anterior ocellus; pedicel and first funicle segment equal in length, second segment one-fifth longer, third equal to first; club twice as long as third segment; malar suture arcuate, length of malar space three-fourths as great as height of compound eye; length of postocellar line twice as great as ocellocular. Mesopraescutum slightly wider than long and bearing two rows of bristles at each lateral margin; submarginal vein of forewing with three or four dorsal bristles; apex of hindwing blunt, fringe at posterior margin one-sixth as wide as wing at hamuli; entire thoracic pleuron shagreened. Surface of propodeum shagreened, strong mesal and para-

spiracular carinae present and a series of short carinae radiating latero-anteriorad from posterior margin (fig. 21, *c*); mesal length of propodeum one-fifth greater than that of postscutellum and slightly more than one-third as great as length of mesoscutellum; propodeal spiracles, separated from anterior margin by a space one-half as great as length of a spiracle; rudimentary petiole narrow, obscure; dorsal surface of gaster very obscurely reticulated, almost smooth, longer than thorax.

Male.—Length, 1.5–1.9 mm. Antennal scape broadened only near apex, flagellar segments without conspicuously long setae, shaped as in female; pedicel and each funicle segment of the same length, club slightly more than twice as long as fourth funicle segment; gaster slightly longer than thorax and propodeum.

Type locality.—Urbana, Ill.

Types.—Holotype, allotype, 9 male and 16 female paratypes in Illinois Natural History Survey collection; 6 female and 3 male paratypes, U.S.N.M. No. 56254.

Described from 23 female and 13 male specimens: Female holotype, male allotype, and 22 female and 12 male paratypes reared from wild lettuce galls of *Aulacidea podagrae* (Bassett), January 26, 1891, C. A. Hart. An additional 20 female and 7 male specimens of this species, not included in the type series, are in the National Museum collection; these appear to have been reared from a stem gall on blueberry made by *Hemadas nubilipennis* Ashmead, March 8, 1872, but these data may not be correct; no locality record is available for these specimens.

TETRASTICHUS MINUTUS (Howard)

Astichus minutus HOWARD, in Comstock, U. S. Dept. Agr., Rep. Ent., 1881, p. 369.—CRESSON, Synopsis of families and genera of Hymenoptera . . . , p. 245, 1887.—VIERECK, Connecticut State Geol. and Nat. Hist. Survey Bull. 22, p. 457, 1916.

Epomphaloides minutus (Howard) GIRAULT, Societas Entomologica, vol. 31, p. 35, 1916.

Tetrastichus lecanii ASHMEAD, Trans. Amer. Ent. Soc., vol. 12, p. xix, 1885.—CRESSON, Synopsis of families and genera of Hymenoptera . . . , p. 246, 1887. (New synonymy.)

Ceranisus lecanii (Ashmead) ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 202, 1887.

Tetrastichus blepyri ASHMEAD, Can. Ent., vol. 32, p. 304, 1902.—ARMITAGE, Journ. Econ. Ent., vol. 16, p. 511, 1923.—GAHAN, Proc. U. S. Nat. Mus., vol. 65, art. 4, p. 19, 1924.—TIMBERLAKE and CLAUSEN, Univ. California Publ. Ent., vol. 3, p. 248, 1924.—MILLER and THOMPSON, Florida Ent., vol. 11, p. 3, 1927.—SMITH and COMPERE, Univ. California Publ. Ent., vol. 4, p. 306, 1928.—MILLER, Florida Agr. Exp. Stat. Bull. 203, p. 456, 1929. (New synonymy.)

Tetrastichus (*Tetrastichodes*) *detrimentosus* GAHAN, Proc. U. S. Nat. Mus., vol. 46, p. 439, 1913; vol. 65, art. 4, p. 19, 1924.

Tetrastichodes detrimentosus Gahan, GIRAULT, Societas Entomologica, vol. 31, p. 35, 1916.

Varying from dull brown to shining black, faintly iridescent; variable areas on scape and pedicel of antennae, trochanters, apices of femora, tibiae, and basal segments of tarsi yellow or white.

Female.—Length, 0.9–1.8 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not reaching anterior ocellus, all funicle segments subequal in length and equal in width; club short, globose, wider than funicle segments and as long as two funicle segments; length of malar space two-thirds as great as height of compound eye; postocellar line twice as long as ocellocular line. Mesopraescutum longer than wide, lacking a median groove and having one row of bristles at each lateral margin, posterior pair of bristles much longer than more anterior ones, as in figure 19, *c*; submarginal vein of forewing with three to five dorsal bristles; apex of hindwing blunt. Surface of propodeum smooth or very slightly roughened anteriorly, median carina only present; spiracles almost touching anterior margin of propodeum; gaster clothed with fairly long bristles.

Male.—Length, 0.8–1.3 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; funicle segments enlarged near bases and bearing numerous, conspicuously long bristles, first segment one-half as long as second; gaster slightly shorter than thorax.

Type locality.—Washington, D. C.

Type.—U.S.N.M. No. 2619. (The type specimen, a male, is in very poor condition; only fragments of the thorax remain. A wing from this type was at one time preserved on a slide, but that slide cannot be found.)

Hosts.—*Anagyrus* spp. parasitic on the grape mealybug, *Pseudococcus maritimus* (Ehrhorn); *Aphycus lounsburyi* (Howard) parasitic on *Lecanium* spp.; the cotton and melon aphid, *Aphis gossypii* Glover; the apple aphid, *Aphis pomi* De Geer; *Aphis* spp.; *Cycloneda sanguinea* (Linnaeus) (may be incorrect); the European fruit lecanium, *Lecanium corni* Bouché; the terrapin scale, *Lecanium nigrofasciatum* Pergande; the European peach scale, *Lecanium persicae* (Fabricius); the false maple scale, *Phenacoccus acericola* (King); *Phenacoccus helianthi* Cockerell; *Physokermes insignicola* (Craw); *Pulvinaria bigeloviae* Cockerell; the black scale, *Saissetia oleae* (Bernard).

Distribution.—Occurs over most of the United States, especially in the Southeast and on the Pacific coast; specimens from South Africa can, also, be placed under this name.

Remarks.—It is possible that this species is always a hyperparasite. It is very likely that the species will eventually be shown to be very widely distributed over the world and have a lengthy synonymy.

TETRASTICHUS FAUSTUS, new species

Black, with blue-green iridescence; usually entire scape and apex of pedicel, apices of femora, tibiae, and basal segments of middle and hind tarsi yellow or white; tibiae may be slightly darkened near base; teneral specimens have broad yellow areas bordering sutures on dorsum of thorax; postscutellum always somewhat lighter in color than rest of thorax.

Female.—Length, 1.5–1.7 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not reaching level of ventral margin of anterior ocellus; first funicle segment as long as pedicel and one and one-fifth times as long as second; third slightly shorter than second and both wider than first, club as long as second and third funicle segments combined; length of malar space two-thirds height of compound eye, malar suture curved just dorsad of base of mandible; length of ocellocular line two-thirds as great as postocellar. Mesopraescutum wider than long and bearing one row of bristles at each lateral margin; submarginal vein of forewing with four or five dorsal bristles; apex of hindwing blunt; entire dorsum of thorax closely and evenly reticulated. Surface of propodeum faintly reticulated, almost smooth, mesal length of propodeum equal to that of metanotum and one-third as great as dorsal length of mesoscutellum; median carina only present; spiracles contiguous with anterior margin of propodeum; gaster elongate, acuminate, one-third longer than thorax.

Male.—Unknown.

Type locality.—East shore, Flathead Lake, Mont.

Types.—U.S.N.M. No. 56255.

Described from the female holotype and 23 female paratypes reared from the cherry maggot, *Rhagoletis fausta* (Osten Sacken), August 10, 1934, R. D. Eichman. Many of the type specimens are teneral.

TETRASTICHUS HIBUS, new species

Black or very dark brown, with faint iridescent sheen, base of gaster somewhat lighter than thorax; apex of pedicel, narrow areas at bases and apices of femora and tibiae and three basal segments of middle and hind tarsi light yellow or white.

Female.—Length, 1.8–2.2 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of ventral margin of anterior ocellus; first funicle segment one and one-fourth times as long as pedicel and one and one-third times as long as second funicle segment, second and third segments equal in length, club slightly shorter than second and third funicle segments combined; length of malar space two-thirds as great as height of compound eye; postocellar line one and one-half times as long as ocellocular. Pro-

notum with distinct femoral grooves, as in figure 17, *e*; mesopraescutum with surface almost smooth, obscure, somewhat longitudinal sculpturing discernible, one row of bristles present at each lateral margin; submarginal vein of forewing with four or five dorsal bristles, marginal vein four times as long as stigmal; apex of hindwing blunt, fringe at posterior margin one-fifth as wide as wing at hamuli; postscutellum somewhat flattened at meson. Surface of propodeum faintly sculptured, almost smooth, median carina only present; mesal length of propodeum one-third as great as length of mesoscutellum; spiracles contiguous with anterior margin of propodeum; gaster from one and one-third to one and one-half times as long as thorax.

Male.—Length, 1.4–2.0 mm. Anterior carina of scape short, located near apex; pedicel slightly longer than first funicle segment, second segment twice as long as first, third and fourth equal in length and each slightly longer than second; club as long as two distal funicle segments combined; funicle segments bearing conspicuously long bristles on enlargements near bases of segments; marginal vein three times as long as stigmal; gaster as long as thorax.

Type locality.—Claremont, Calif.

Types.—U.S.N.M. No. 56256.

Described from the female holotype, male allotype, and 15 female and 12 male paratypes reared from a "cup gall" on white sage (*Artemisia ludoviciana*), January 25–February 22, 1923, by J. G. Needham.

Host.—The host of this species possibly is *Diarthronomyia occidentalis* (Felt).

TETRASTICHUS CARINATUS Forbes

FIGURES 16, *d*; 20, *i*

Tetrastichus carinatus FORBES, Illinois State Ent. Rep, 1885, p. 48.—GAHAN, U. S. Dept. Agr. Misc. Publ. 174, p. 138, 1933 (this paper includes a bibliography complete through 1932).—ROCKWOOD and REEHER, U. S. Dept. Agr. Techn. Bull. 361, p. 18, 1933.—HILL, PINCKNEY, and UDINE, U. S. Dept. Agr. Techn. Bull. 689, p. 12, 1939.—HILL and PINCKNEY, U. S. Dept. Agr. Techn. Bull. 715, p. 10, 1940.

Tetrastichus rileyi LINDEMANN, Bull. Soc. Nat. Moscou, ser. 2, vol. 1, p. 183, 1887.

Body light to dark brown, sometimes black, with rather faint metallic iridescence; legs (except bases of coxae) usually entirely yellow or white, femora occasionally darkened on basal half.

Female.—Length, 0.75–2.0 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus or slightly higher; first funicle segment from one and two-fifths to one and one-half times as long as second segment, segments two and three equal in length, club slightly shorter than second and third funicle segments combined (fig. 16, *d*); length of malar

space one-half height of compound eye; postocellar line twice as long as ocellocular. Mesopraescutum as wide as long and bearing one and a partial second row of bristles at each lateral margin; prepectus reticulated, rest of mesopleuron smooth, submarginal vein of forewing with two to four dorsal bristles; mesoscutellum either with two or three pairs of bristles; hindwing blunt at apex, fringe at posterior margin usually one-fifth as wide as wing at hamuli (fig. 20, *i*). Surface of propodeum faintly sculptured, strong median carina present, paraspiracular carinae absent; mesal length of propodeum one-fourth as great as length of mesoscutellum; propodeal spiracles not quite touching anterior margin; gaster from one-quarter to one-third longer than thorax.

Male.—Length, 1.5 mm. First funicle segment two-thirds as long as second, second to fourth equal in length; pedicel and first funicle segment equal in length; club as long as third and fourth funicle segments combined; setae borne by funicle segments twice as long as segments; gaster as long as thorax.

Type locality.—Anna, Ill.

Types.—Female lectotype and one female paratype in Illinois Natural History Survey collection.

Hosts.—*Phytophaga destructor* (Say), the Hessian fly; *Phytophaga phalaris* (Barnes).

Distribution.—Probably worldwide; generally distributed in the wheat-growing areas of the United States, except those immediately west of the Mississippi River.

TETRASTICHUS REPULSUS Girault

Tetrastichus repulsus GIRAULT, New chalcid flies, p. 4, 1917.

Iridescent blue-green or purple; pedicel or entire antenna, trochanters partly, apices of femora, tibiae, and tarsi light yellow or white.

Female.—Length, 1.9–2.8 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of vertex; first funicle segment one-half longer than pedicel, second and third segments equal in length and each one-fifth shorter than first; club as long as pedicel and first funicle segment; length of malar space two-thirds as great as height of compound eye; postocellar line slightly more than twice as long as ocellocular. Mesopraescutum wider than long, and bearing two rows of bristles at each lateral margin; submarginal vein of forewing with three or four dorsal bristles; apex of hindwing blunt, width of fringe at posterior margin one-fifth as great as width of wing at hamuli. Surface of propodeum almost smooth, showing very faint reticulations under strong light; length of mesoscutellum three and one-half times as great as mesal length of

propodeum, paraspiracular carinae wanting; propodeal spiracles large, almost touching anterior margin; gaster narrow and acutely pointed, almost twice as long as thorax.

Male.—Unknown.

Type locality.—Ames, Iowa.

Types.—U.S.N.M. No. 20965.

Host.—Unknown.

Distribution.—Iowa.

Remarks.—Known only from the two type specimens.

TETRASTICHUS MALOPHILUS, new species

Very dark, iridescent blue, with antennal flagellum, apices of femora, tibiae, basal segments of tarsi, and all bristles and pubescence white or light yellow.

Female.—Length, 0.8–1.0 mm. Antennae inserted at level of ventral margins of compound eyes; scape short, its apex reaching a point only two-thirds the distance from clypeal margin to anterior ocellus; pedicel and first two funicle segments each equal in length, third segment one-fifth shorter, funicle segments as wide as long; club as long as first two funicle segments; length of postocellar line three times as great as ocellocular. Spiracles clearly visible at posterolateral angles of pronotum; mesopraescutum wider than long and bearing one or two rows of bristles at each lateral margin; submarginal vein of forewing with two dorsal bristles; apex of hindwing blunt, fringe at posterior margin one-fourth as wide as wing at hamuli. Surface of propodeum slightly roughened, faint median carina present; mesal length of propodeum one-fifth greater than length of postscutellum, and one-third as long as mesoscutellum; propodeal spiracles separated from anterior margin by a space equal to diameter of a spiracle; gaster globose (flattened in dry specimens), as long as thorax.

Male.—Unknown.

Type locality.—Milford Center, Ohio.

Types.—U.S.N.M. No. 56257.

Described from the female holotype and 4 female paratypes reared from the apple flea weevil, *Orchestes pallicornis* Say, June 24–25, 1930, by J. S. Houser.

TETRASTICHUS BRUCHOPHAGI Gahan

FIGURES 17, *d*; 21, *f*

Tetrastichus bruchophagi GAHAN, Proc. U. S. Nat. Mus., vol. 46, p. 349, 1913.—URBAHNS, Journ. Agr. Res., vol. 8, p. 277, 1917.—WILLIAMSON, Minnesota Rep. State Ent. No. 17, p. 106, 1918.—GAHAN, Ann. Ent. Soc. Amer., vol. 12, p. 167, 1919.—URBAHNS, U. S. Dept. Agr. Dept. Bull. 812, p. 17, 1920.—SWEZEY, Proc. Haw. Ent. Soc., vol. 7, p. 383, 1931.—NIKOL'SKAYA, Plant. Prot. (Russian),

No. 1, p. 109, 1932.—SWEZEY, Proc. Haw. Ent. Soc., vol. 8, p. 381, 1934.—
SORENSEN, Proc. Utah Acad. Sci., Arts, and Letters, vol. 11, p. 241, 249, 1934.—
NIKOL'SKAYA, Bull. Cent. Asia. Sci. Res., Cotton Inst. (Russian), p. 120, 1934.

Bright, iridescent blue; apices of femora, tibiae, and basal segments of tarsi, light yellow or white; occasional specimens have the metatibiae darkened; antennal scape sometimes yellow.

Female.—Length, 1.3–1.6 mm. Antennae inserted ventrad of level of ventral margins of compound eyes; apex of scape not reaching level of anterior ocellus; pedicel one-third longer than first funicle segment, second segment one-sixth longer than first, third one-eighth longer than second; club one-third longer than second and third funicle segments combined; length of malar space slightly more than one-half height of compound eye; postocellar line three times as long as ocellular. Mesopraescutum slightly wider than long and bearing two rows of bristles at each lateral margin; submarginal vein of forewing with two or three dorsal bristles; apex of hindwing blunt, width of fringe at posterior margin one-fourth width of wing at hamuli; disk of mesopleuron smooth, prepectus only faintly reticulated. Surface of propodeum smooth or very faintly reticulated, paraspircular carinae absent; length of mesoscutellum three and one-half times as great as mesal length of propodeum; propodeal spiracles large, not quite touching anterior margin; length of gaster one and one-third times as long as thorax.

Male.—Length, 1.4 mm. Antennae usually entirely yellow; pedicel one-sixth longer than first funicle segment, funicle segments quadrate, second one-sixth longer than first, third and fourth equal in length and each one-eighth longer than second; setae as long as funicle segments borne on obscure basal elevations; club one-fifth longer than second and third funicle segments combined; gaster as long as, or slightly shorter than, thorax.

Type locality.—Corcoran, Calif.

Types.—U.S.N.M. No. 16357.

Host.—The clover and alfalfa chalcid, *Bruchophagus funebris* (Howard).

Distribution.—Probably worldwide; generally distributed in North America and Europe; known also from Argentina.

TETRASTICHUS MARCOVITCHI (Crawford)

Geniocerus marcovitchi CRAWFORD, Proc. U. S. Nat. Mus., vol. 48, p. 586, 1915.—
MARCOVITCH, Ann. Ent. Soc. Amer., vol. 8, p. 170, 1915.—LEONARD, New York
(Cornell) Agr. Exp. Stat. Mem. 101, p. 984, 1928.

Brown, with faint bluish iridescent luster, anterior side of scape, all of pedicel but dorsobasal area, ventral side of flagellum, mesal lobe of metanotum, bases and apices of femora and tibiae, and basal segments

of tarsi light yellow or white; anterior tibiae may be almost entirely yellow.

Female.—Length, 1.5–1.9 mm. Antennae inserted slightly dorsad of level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus; length of malar space one-half height of compound eye; postocellar line one and one-half times as long as ocellular; mesopraescutum with one row of bristles at each lateral margin; submarginal vein of forewing with four or five dorsal bristles; apex of hindwing blunt, fringe at posterior margin one-third as wide as wing at hamuli. Surface of propodeum smooth, paraspicular carinae absent; spiracles touching anterior margin of propodeum; median length of propodeum one-fourth as long as mesoscutellum; gaster one and one-half times as long as thorax.

Male.—Length, approximately 1.5 mm. Small, darkened anterior carina located near apex of scape; funicle segments bearing conspicuously long bristles on enlargements near bases; gaster as long as thorax.

Type locality.—Ithaca, N. Y.

Type.—U.S.N.M. No. 18382.

Host.—This species originally was thought to be parasitic on *Tetrastichus* (*Geniocerus*) *juniperi*, or a species of *Eurytoma*, but it more likely is parasitic on some midge larvae or the larvae of *Anthonomus juniperinus* Sanborn, which develop in juniper berries.

Distribution.—Nevada, New York.

TETRASTICHUS RAPO (Walker)

FIGURE 21, c

Cirrospilus rapo WALKER, Ann. Mag. Nat. Hist., vol. 3, p. 415, 1839.

Geniocerus rapo (Walker) KURDJUMOV, Russ. Ent. Obozr. (Rev. Russe Ent.), vol. 13, p. 250, 1913 (this paper lists European synonymy).

Tetrastichus rapo (Walker) WALKER, List of the specimens of hymenopterous insects in the collection of the British Museum, Chalcidoidea, vol. 1, p. 70, 1846.—MASI, Bol. Portici Scuola Super. Agr., Lab. Zool. Gen. e Agr., vol. 3, p. 133, 1908.—SILVESTRI, Bol. Portici Scuola Super. Agr., Lab. Zool. Gen. e Agr., vol. 4, p. 281, 1910.—GAUTIER, Compt. Rend. Soc. Biol. [Paris], vol. 82, p. 720, 1919; Bull. Soc. Ent. France, 1921, p. 143.—PICARD, Bull. Soc. Ent. France, 1921, p. 206; Bull. Biol. France et Belg., vol. 56, p. 54, 1922.—GAUTIER and BONNAMOUR, Rev. Path. Veg. et Ent. Agr. France, vol. 11, p. 246, 1924.—FAURE, Compt. Rend. Soc. Biol. [Paris], vol. 93, p. 524, 1925.—FERRIERE and FAURE, Ann. Epiphyt., vol. 11, p. 221, 1925.—GEORGE, Bull. Soc. Hist. Nat. l'Afrique du Nord, vol. 18, p. 55, 1927.—LEONARD, New York (Cornell) Agr. Exp. Stat. Mem. 101, p. 984, 1928.—MOSS, Journ. Anim. Ecol., vol. 2, p. 210, 1933.—MUGGERIDGE, New Zealand Journ. Agr., vol. 47, p. 135, 1933.

Tetrastichus microgastri CHITTENDEN, U. S. Bur. Ent. Bull. 54 (n. s.), p. 79, 1905; U. S. Bur. Ent. Circ. 60, p. 5, 1905; U. S. Dept. Agr. Farmers' Bull. 766, p. 8, 1916.

Bright, iridescent green; base of abdomen often tan or brown; apices of femora and usually entire middle and hind tibiae white;

anterior tibiae tan or brown, middle and hind tibiae sometimes slightly darkened.

Female.—Length, 1.4–1.8 mm. Antennae inserted at level of ventral margins of compound eyes; first funicle segment as long as pedicel, all funicle segments equal in length and each as long as wide; club as long as two funicle segments combined; length of malar space three-fourths height of compound eye; postocellar line two and one-half times as long as ocellocular. Mesopraescutum as long as wide and bearing two rows of bristles at each lateral margin; disk of mesopleuron smooth; submarginal vein of forewing with two or three dorsal bristles; apex of hindwing blunt, fringe at posterior margin one-fifth as wide as wing at hamuli. Surface of propodeum smooth, paraspircular carinae wanting (fig. 21, *e*); mesal length of propodeum one-fourth length of mesoscutellum; propodeal spiracles almost round, not quite touching anterior margin; gaster equal to or slightly longer than thorax.

Male.—Length, 1.1–1.5 mm. Pedicel enlarged, globose, as long as first funicle segment, second funicle segment slightly longer than first, third and fourth segments equal and each as long as second. funicle segments subglobose, bearing setae only one-half longer than themselves; club four-fifths as long as three apical funicle segments; gaster and thorax equal in length.

Type locality.—England.

Types.—In the British Museum; specimens compared with types by Dr. Ch. Ferrière.

Host.—*Apanteles glomeratus* (Linnaeus) parasitic on the cabbage butterfly, *Pieris rapae* (Linnaeus).

Distribution.—Probably worldwide; generally distributed both in Europe and North America.

TETRASTICHUS MICRORHOPALAE Ashmead

Tetrastichus microrhopalae ASHMEAD, Trans. Amer. Ent. Soc., vol. 23, p. 234, 1896.—CHITTENDEN, U. S. Bur. Ent. Bull. 38 (n. s.), p. 88, 1902.—GIRAULT, Societas Entomologica, vol. 31, p. 36, 1916.

Brown, with faint greenish iridescence; trochanters, apices of femora, tibiae, and basal segments of middle and hind tarsi white or yellow.

Female.—Length, 1.1–1.3 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape not reaching level of anterior ocellus, first funicle segment one-quarter shorter than pedicel, second segment equal to pedicel, third slightly longer, club equal to second and third funicle segments combined; length of malar space three-fifths height of compound eye; postocellar line three times as long as ocellocular. Mesopraescutum slightly wider than long and

with one irregular row of bristles at each lateral margin; submarginal vein of forewing with two or three dorsal bristles; apex of hindwing acute, fringe at posterior margin one-third width of wing at hamuli. Surface of propodeum smooth, and with only a vague median carina; median length of propodeum slightly more than one-quarter length of mesoscutellum; propodeal spiracles round, separated from anterior margin by a space equal to diameter of a spiracle; gaster one and one-third times as long as thorax.

Male.—Length, 1.2 mm. Scape with a darkened anterior carina on its apical two-thirds; first funicle segment two-thirds as long as pedicel, second segment slightly longer than first, third and fourth equal in length and each as long as pedicel, funicle segments bearing setae as long as the segments, club as long as last three funicle segments; gaster equal in length to thorax.

Type locality.—Rosslyn, Va.

Types.—U.S.N.M. No. 41333. (Specimens in rather poor condition.)

Host.—Larvae of goldenrod leaf miner, *Microrhopala xerene* (Newman).

Distribution.—Virginia.

TETRASTICHUS CHLAMYTIS Ashmead

Tetrastichus chlamytis ASHMEAD, Trans. Amer. Ent. Soc., vol. 23, p. 234, 1896.

Dark iridescent blue; scape of female usually, pedicel, bases and apices of femora, tibiae, and basal segments of tarsi light yellow or white.

Female.—Length, 2.0 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; apex of scape not reaching level of ventral margin of anterior ocellus; second and third funicle segments equal in length, first segment slightly shorter than either, club longer than two distal funicle segments; length of malar space two-thirds as great as height of compound eye; length of postocellar line twice as great as ocellocular line. Pronotum with well-marked femoral groove, as in figure 17, *e*; median longitudinal groove of mesopraescutum almost entirely obliterated, mesopraescutum as long as wide and usually bearing one row of bristles at each lateral margin, occasionally with one or two bristles mesad of each lateral row near anterior margin; submarginal vein of forewing with two dorsal bristles, marginal vein two and one-quarter times as long as stigmal vein; hindwing blunt at apex, width of fringe at posterior margin slightly less than one-fourth as great as width of wing at hamuli. Surface of propodeum smooth, or very faintly roughened, paraspiracular carinae wanting; mesal length of propodeum slightly less than mesal length of metanotum and one-fifth as great as length of mesoscutellum;

propodeal spiracles well separated from anterior margin; gaster from one and two-thirds to twice as long as thorax.

Male.—Length, 1.4–1.75 mm. Pedicel and second to fourth funicle segments each equal in length, first funicle segment one-fourth shorter, funicle segments subquadrate, without conspicuously long bristles, club as long as funicle; gaster and thorax equal in length.

Type locality.—Rosslyn, Va.

Types.—U.S.N.M. No. 41334.

Hosts.—*Chlamys gibbosa* (Fabricius), *Chlamys* spp.

Distribution.—District of Columbia, Illinois, Maine, Maryland, Minnesota, Mississippi, Virginia.

TETRASTICHUS GERSTAECKERIAE Gahan

Tetrastichus gerstaeckeriae GAHAN, Proc. U. S. Nat. Mus., vol. 83, p. 485, 1936.

Very dark brown or black with iridescent blue-green reflections; antennae, trochanters, apical third of femora, tibiae, and tarsi yellow.

Female.—Length, 2.0–3.0 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of ventral margin of anterior ocellus, all funicle segments equal in length and each three-fourths as long as pedicel, club as long as two funicle segments combined; postocellar line two and one-half times as long as ocellocular. Mesopraescutum as wide as long and bearing one row of bristles at each lateral margin; submarginal vein of forewing with three or four dorsal bristles; apex of hindwing blunt, width of fringe at posterior margin one-fifth width of wing at hamuli. Surface of propodeum smooth, or very faintly roughened, median carina only present; mesal length of propodeum one-fifth length of mesoscutellum; propodeal spiracles separated from anterior margin by a space equal to one-half diameter of a spiracle; gaster from twice to almost three times as long as thorax.

Male.—Length, 1.4 mm. Scape greatly enlarged, globular, darkened anterior carina extending from near base to apex; first funicle segment one-third shorter than pedicel, three following funicle segments equal and each one-fifth shorter than first, club as long as first two funicle segments, segments quadrate, and bearing setae no longer than those on female antennae; gaster as long as thorax.

Type locality.—Probably Uvalde, Tex.

Types.—U.S.N.M. No. 51450.

Hosts.—Cactus weevils, *Gerstaeckeria porosa* (LeConte), *Gerstaeckeria nobilis* (LeConte).

Distribution.—Texas.

TETRASTICHUS RUGGLESII Rohwer

Tetrastichus rugglesi ROHWER, Can. Ent., vol. 51, p. 160, 1919.

Brown, with purple and blue-green iridescence; antennae, trochanters, apices of femora, tibiae (except for occasional vague ring

near base), and basal segments of middle and hind tarsi white; front tarsi usually tan, gaster light brown at base.

Female.—Length, 2.0 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus; all funicle segments equal in length and each one-eighth shorter than pedicel, club as long as two distal funicle segments; postocellar line two and one-half times as long as ocellocular; length of malar space two-thirds as great as height of compound eye; mesopraescutum with two rows of bristles at each lateral margin; submarginal vein of forewing with two or three dorsal bristles; metacoxae entirely glabrous; surface of propodeum smooth, paraspiracular carinae absent; propodeal spiracles large, not touching anterior margin; mesal length of propodeum one-fifth as great as length of mesoscutellum; gaster twice as long as thorax.

Male.—Length, 1.8 mm. Funicle segments with transverse basal enlargements, these bearing setae slightly longer than segments; gaster and thorax equal in length.

Type locality.—St. Paul, Minn.

Types.—U.S.N.M. No. 22132.

Hosts.—Flat-headed borers, *Agilus arcuatus* (Say), *Agilus rubicola* Abeille, *Agilus champlaini* Frost.

Distribution.—Connecticut, Minnesota, New York, West Virginia.

TETRASTICHUS THANASIMI Ashmead

Tetrastichus thanasimi ASHMEAD, Trans. Amer. Ent. Soc., vol. 21, p. 343, 1894.—

GIRAULT, Societas Entomologica, vol. 31, p. 36, 1916.

Tetrastichodes thanasimi (Ashmead) GIRAULT, Societas Entomologica, vol. 31, p. 35, 1916.

Very dark, shining brown, non-iridescent; antennae, trochanters, apices of femora, bases and apices of tibiae, and basal segments of middle and hind tarsi white or light yellow.

Female.—Length, 1.1–1.3 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; scape two and one-quarter times as long as pedicel, funicle segments becoming progressively shorter, so that third segment is two-thirds as long as first, club as long as pedicel and first funicle segment combined, length of malar space three-fourths as great as height of compound eye; postocellar line twice as long as ocellocular. Mesopraescutum with one or two rows of bristles at each lateral margin; submarginal vein of forewing with three to five dorsal bristles; marginal vein two and one-half times as long as stigmal vein; apex of hindwing blunt, fringe at posterior margin one-fourth as wide as wing at hamuli. Surface of propodeum smooth, mesal length two-fifths as great as length of mesoscutellum; paraspiracular carinae wanting; spiracles separated from anterior mar-

gin by a space as great as length of a spiracle; gaster only slightly longer than thorax.

Male.—Length, 1.0 mm. All four funicle segments equal in length, semiquadrate, and without long bristles, club three-quarters as long as funicle; gaster and thorax equal in length.

Type locality.—Morgantown, W. Va.

Types.—U.S.N.M. No. 41340.

Hosts.—Larvae of clerid beetles, *Cymatodera* sp., *Thanasimus trifasciatus* Say, *Thanasimus* spp.

Distribution.—California, Montana, Pennsylvania, West Virginia.

TETRASTICHUS VARICORNIS (Girault), new combination

FIGURE 16, *f*

Epitetrastichus varicornis GIRAULT, Descriptiones hymenopterorum chalcidoidicarum variorum cum observationibus, pt. 3, p. 4, 1917.

Body black; part of scape, antennal club, middle and hind trochanters, bases and apices of femora and tibiae, and basal segments of middle and hind tarsi white.

Female.—Length, 1.8 mm. Antennal pedicel one-eighth longer than first funicle segment; second four-fifths as long as first, third three-fifths as long as first, each flagellar segment shorter and wider than preceding one (fig. 16, *f*), club globose, as long as second and third funicle segments combined. Mesopraescutum as long as wide and bearing one row of bristles at each lateral margin; submarginal vein of forewing with five dorsal bristles; apex of hindwing blunt, fringe at posterior margin one-fifth as wide as wing at hamuli. Surface of propodeum lightly shagreened; mesal length of propodeum slightly greater than that of postscutellum, and one-fourth as great as length of mesoscutellum; propodeal spiracles small, almost contiguous with anterior margin; gaster as long as thorax.

Male.—Unknown.

Type locality.—Glenn Dale, Md.

Type.—U.S.N.M. No. 20858. (Specimen in poor condition.)

Host.—Unknown.

Distribution.—Maryland.

Remarks.—Only known from the unique type specimen; additional material may greatly alter the conception of this species.

TETRASTICHUS NEUROTERTI (Ashmead), new combination

Hyperteles neuroterti ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 203, 1887.

Dull brown or black, noniridescent; apices of coxae, trochanters, bases and apices of femora and tibiae, and basal segments of tarsi light yellow or white.

Female.—Length, 1.1–1.3 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of ventral margin of anterior ocellus; all funicle segments subequal in length; club as long as first two funicle segments combined; length of malar space two-fifths height of compound eye; postocellar line twice as long as ocellocular. Mesopraescutum as wide as long and bearing one row of bristles at each lateral margin; submarginal vein of forewing with three or four dorsal bristles; marginal vein four times as long as stigmal vein; apex of hindwing blunt, fringe at posterior margin one-fourth width of wing at hamuli. Surface of propodeum smooth, paraspiracular carinae wanting; mesal length of propodeum one-third length of mesoscutellum; propodeal spiracles contiguous with anterior margin; gaster short, globose, one-third longer than thorax.

Male.—Length, 0.8 mm. Scape with darkened anterior carina short, located near apex; pedicel one-fifth longer than first funicle segment, second to fourth segments equal and each twice as long as first segment, funicle segments enlarged near bases and bearing long setae; club as long as last two funicle segments; gaster and thorax equal in length.

Type locality.—Jacksonville, Fla.

Types.—U.S.N.M. No. 25953.

Hosts.—Jumping bullet gall, *Neuroterus saltarius* Weld, on *Quercus undulata*; *Neuroterus rileyi* Bassett on *Quercus stellata*; also a series was said to have come from peppergrass seeds, but that record is probably incorrect. The host name mentioned for this species in the original description, *Neuroterus atomus* Ashmead, is a nomen nudum.

Distribution.—District of Columbia, Florida, Illinois, Missouri, New York, Virginia.

TETRASTICHUS SILVATICUS Gahan

Tetrastichus silvaticus GAHAN, Proc. Ent. Soc. Washington, vol. 39, p. 266, 1937.—HOBSON, Ann. Ent. Soc. Amer., vol. 32, p. 131, 1939 (*sylvaticus*).

Black, noniridescent; variable areas on pedicel and basal segments of flagellum, trochanters, bases and apices of femora and tibiae, and basal segments of tarsi light yellow or white.

Female.—Length, 1.1 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape reaching level of anterior ocellus; first funicle segment one-third shorter than pedicel and one-sixth longer than second segment, second and third equal in length; club as long as second and third funicle segments combined; length of malar space one-half as great as height of compound eye; postocellar line twice as long as ocellocular. Mesopraescutum wider than long, provided with one row of bristles at each lateral margin; submarginal vein of forewing with two or three dorsal bristles; marginal

vein three and one-half times as long as stigmal vein; apex of hindwing blunt, width of fringe at posterior margin one-third as great as width of wing at hamuli. Surface of propodeum faintly reticulated, sometimes smooth, paraspiracular carinae wanting; mesal length of propodeum one-third as great as length of mesoscutellum; propodeal spiracles almost contiguous with anterior margin; gaster one and one-third to one and one-half times as long as thorax.

Male.—Length, 1.0 mm. Pedicel one-sixth longer than first funicle segment; second to fourth segments equal in length and each one-third longer than first, funicle segments enlarged near bases and bearing long setae; club as long as three distal funicle segments; gaster slightly shorter than thorax.

Type locality.—Ely, Minn.

Types.—U.S.N.M. No. 52253.

Host.—Eggs of the forest tent caterpillar, *Malacosoma disstria* (Huebner).

Distribution.—Minnesota, New Brunswick, Vermont.

TETRASTICHUS NEBRASKENSIS (Girault), new combination

Necomphaloidella nebraskensis GIRAULT, Can. Ent., vol. 48, p. 103, 1916.

Usually entirely dull brown, sometimes almost black; area around mouthparts, trochanters, bases and apices of femora, tibiae, and basal segments of tarsi light yellow or white; metatibiae often partly brown; mesal area of postscutellum and base of abdomen usually yellow, always somewhat lighter in color than dorsum of thorax.

Female.—Length, 1.5–1.8 mm. First funicle segment as long as pedicel, second and third segments equal in length and each three-fourths as long as first; club as long as first two funicle segments; length of malar space one-half as great as height of compound eye; postocellar line one and one-half times as long as ocellocular. Mesopraescutum slightly wider than long and bearing one row of bristles at each lateral margin; submarginal vein of forewing with from three to five dorsal bristles; marginal vein three times as long as stigmal vein; hindwing blunt at apex, fringe at posterior margin one-fourth as wide as wing at hamuli; both pairs of mesoscutellar bristles located posterior to midpoint of mesoscutellum. Surface of propodeum almost smooth; paraspiracular carinae wanting; mesal length of propodeum one-third as great as length of mesoscutellum; propodeal spiracles contiguous with anterior margin; thorax two-thirds as long as gaster.

Male.—Unknown.

Type locality.—Lincoln, Nebr.

Types.—U.S.N.M. No. 19919.

Host.—Either the clover seed midge, *Dasyneura leguminicola* (Lintner), or the clover leaf weevil, *Hypera nigrirostris* (Fabricius). The former is probably the true host.

Distribution.—Indiana, Kansas, Nebraska, New Brunswick, Oregon, Washington.

TETRASTICHUS ROSAE Ashmead

Tetrastichus rosae ASHMEAD, Trans. Amer. Ent. Soc., vol. 13, p. 134, 1886.—

CRESSON, Synopsis of families and genera of Hymenoptera, p. 245, 1887.

Brown or black, noniridescent; apices of coxae, trochanters, bases and apices of femora, tibiae, and basal segments of tarsi, light yellow or white; color of legs somewhat variable; middle and hind tibiae may be slightly darkened, and femora sometimes almost entirely yellow.

Female.—Length, 1.8 mm. Antennae inserted slightly ventrad of level of ventral margins of compound eyes; apex of scape not quite reaching level of anterior ocellus; pedicel and all funicle segments equal in length; club three-fourths as long as funicle; length of malar space three-fourths as great as height of compound eye; postocellar line twice as long as ocellular. Mesopraescutum as long as wide and bearing a single row of setae at each lateral margin; submarginal vein of forewing with four to six dorsal bristles, marginal vein thickened at base and three and one-half times as long as stigmal vein; apex of hindwing blunt, width of fringe at posterior margin one-fourth width of wing at hamuli. Propodeum lightly reticulated, paraspircular carinae absent; mesal length of propodeum one-third length of mesoscutellum; propodeal spiracles almost touching anterior margin; gaster narrow, acutely pointed, twice as long as thorax.

Male.—Unknown. The male specimens mentioned in the original description are not conspecific with the female.

Type locality.—Jacksonville, Fla.

Type.—U.S.N.M. No. 2843. The type series is mixed; a lectotype female has, therefore, been designated.

Hosts.—Mealy rose gall, *Diplolepis ignotus* (Osten Sacken); *Diplolepis ostensackeni* (Beutenmüller).

Distribution.—Colorado, District of Columbia, Florida, Idaho, Michigan, Virginia.

TETRASTICHUS BLASTOPHAGI (Ashmead)

Hyperteles blastophagi ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 202, 1887.

Tetrastichus blastophagi (Ashmead) GIRAULT, Societas Entomologica, vol. 31, p. 35, 1916.

Body light brown, noniridescent; antennae, apices of femora, tibiae, and basal segments of tarsi light yellow or white; metatibiae may be slightly darkened.

Female.—Length, 1.2–1.4 mm. Antennae inserted at level of ventral margins of compound eyes; apex of scape almost reaching level of anterior ocellus; pedicel and first funicle segment equal in length, second segment slightly shorter than first, third funicle segment as long as first; club as long as second and third funicle segments combined; length of malar space slightly less than one-half height of compound eye; postocellar line twice as long as ocellular. Mesopraescutum slightly wider than long and bearing one row of bristles at each lateral margin, median groove well defined; submarginal vein of forewing with from three to five dorsal bristles; apex of hindwing blunt, width of fringe at posterior margin one-fourth as great as width of wing at hamuli. Surface of propodeum smooth, paraspircular carinae wanting, median carina vague; mesal length of propodeum one-fifth length of mesoscutellum; propodeal spiracles contiguous with anterior margin; gaster globose (flattened in dry specimens), its length one-third greater than that of thorax.

Male.—Length, 1.0 mm. Abdomen slightly lighter in color at base. Pedicel of antenna globular, twice as long as first funicle segment, second to fourth funicle segments equal in length and each one-fifth longer than pedicel, funicle segments enlarged near bases, and bearing long setae on these enlargements; club as long as three apical funicle segments; apex of scape reaching level of dorsal margin of anterior ocellus; gaster equal in length to thorax.

Type locality.—Jacksonville, Fla.

Types.—U.S.N.M. No. 25954.

Host.—*Callirhytis blastophaga* (Ashmead), the staminate flower gall of *Quercus cinerea*.

Distribution.—District of Columbia, Florida.

TETRASTICHUS LASIUS, new name

Tetrastichodes lasiopterae ASHMEAD, Journ. Cincinnati Soc. Nat. Hist., vol 17, p. 54, 1894.—DALLA TORRE, Catalogus hymenopterorum, vol. 5, p. 1898. [Not *Tetrastichus* (*Geniocerus*) *lasiopterae* (Lindemann) Dalla Torre.]

Almost completely brown; area of head around mouth parts, median area of postscutellum, and legs almost white; femora and tibiae slightly darkened.

Apex of scape reaching level of anterior ocellus; all funicle segments equal in length; mesopraescutum with one row of bristles at each lateral margin; submarginal vein of forewing with four or five dorsal bristles; apex of hindwing blunt; propodeum almost smooth, minutely roughened; median carina only present, spiracles contiguous with anterior margin of propodeum.

Male antenna bearing conspicuously long bristles on elevations near bases of funicle segments.

Type locality.—Cincinnati, Ohio.

Types.—U.S.N.M. No. 56258.

Host.—Grass midge, *Asteromyia agrostis* (Osten Sacken), on *Muhlenbergia* and *Distichlis*.

Distribution.—Ohio.

TETRASTICHUS JUNIPERI (Crawford)

Geniocerus juniperi CRAWFORD, Proc. U. S. Nat. Mus., vol. 48, p. 585, 1915.—

MARCOVITCH, Ann. Ent. Soc. Amer., vol. 8, p. 169, 1915.—LEONARD, New York (Cornell) Agr. Exp. Stat. Mem. 101, p. 984, 1928.

(?) *Epitetrastichus silvae* GIRAULT, in Felt, New York State Mus. Bull. 200, p. 21, 1917 (manuscript name).

This species differs from *T. marylandensis* (Girault), redescribed on p. 598, only in having the apex of the antennal scape reaching the level of the dorsal margin of the anterior ocellus, the first funicle segment one and one-third times as long as the second, and the propodeum one-fourth as long as the mesoscutellum, rather than only one-fifth as long.

Type locality.—Ithaca, N. Y.

Types.—U.S.N.M. No. 18381.

Host.—*T. juniperi* was originally thought to be phytophagous and develop in juniper berries. This species is more likely to be parasitic on some midge larvae or *Anthonomus juniperinus* Sanborn, which develop in the juniper berries.

Distribution.—New York, Oregon.

TETRASTICHUS IMPEXUS Girault

Tetrastichus impevus GIRAULT, New chalcid flies, p. 2, 1917.

Dark brown, noniridescent; mouthparts and area on head immediately around them, bases and apices of femora and tibiae, and mesal area of postscutellum yellow.

Female.—Length, 2.2 mm. Apex of scape not reaching level of anterior ocellus; first funicle segment as long as pedicel, second segment slightly longer than first, third as long as first, club as long as pedicel and first funicle segment combined; mesopraescutum as long as wide and bearing one row of bristles at each lateral margin; marginal vein of forewing with three or four dorsal bristles; mesal length of propodeum one-third as great as length of mesoscutellum; spiracles contiguous with anterior margin, paraspiracular carinae wanting; gaster one-third longer than thorax.

Male.—Unknown.

Type locality.—Falls Church, Va.

Type.—U.S.N.M. No. 21066. (Specimen in poor condition.)

Host.—Gall of *Disholcaspis globulus* (Fitch) on *Quercus stellata*.

Distribution.—Virginia.

Remarks.—Known only from the single type specimen.

TETRASTICHUS MARYLANDENSIS (Girault)

Epitetrastichus marylandensis GIRAULT, Ann. Ent. Soc. Amer., vol. 9, p. 295, 1916.—FENNAH, Rep. St. Lucia Agr. Dept. for 1938, p. 35, 1939; for 1939, p. 25, 1940.

Epitetrastichus cuneiformis GIRAULT, Descriptiones stellarum novarum, p. 18, 1917. (New synonymy.)

Tetrastichus marylandensis (Girault) FENNAH, Rep. St. Lucia Dept. Agr. for 1938, p. 35, 1939; for 1939, p. 25, 1940.

Body usually almost entirely yellow, with variable light brown areas on head and thorax, transverse brown stripes on dorsum of gaster, occasional specimens almost entirely brown; legs usually entirely yellow, femora sometimes darkened; males usually entirely brown, occasionally almost entirely yellow.

Female.—Length, 1.0–1.85 mm. Apex of antennal scape not quite reaching level of anterior ocellus, all funicle segments subequal in length; mesopraescutum with one row of bristles at each lateral margin; submarginal vein of forewing with three to five dorsal bristles; propodeum smooth, paraspiracular carinae wanting, spiracles touching anterior margin of propodeum, mesal length of propodeum one-fifth as great as length of mesoscutellum; gaster acutely pointed, longer than thorax.

Male.—Length, 0.8–1.5 mm. Funicle segments bearing conspicuously long setae near bases; gaster as long as thorax.

Type locality.—Glenn Dale, Md.

Type.—U. S. N. M. No. 19935.

Hosts.—The host records for this species are somewhat confusing; *T. marylandensis* is said to have come from various unidentified midge larvae, as well as from the pine twig moth, *Rhyacionia frustrana* (Comstock), the pine leaf miner, *Exoteleia pinifoliella* (Chambers), the corn leaf aphid, *Aphis maidis* Fitch, and eggs of various Lepidoptera and Coleoptera. Some of those records undoubtedly are wrong.

Distribution.—District of Columbia, Illinois, Maryland, Massachusetts, Mississippi, Missouri, Virginia.

HOST LIST

The following list contains the information at present available concerning the hosts for the various species of *Tetrastichus*. These hosts are heterogeneous, ranging from the Orthoptera to the Hymenoptera and Diptera, and include even some spiders. There is, also, no uniformity in the particular stage of the host that is affected.

Species of this genus have been reared from the eggs, larvae, nymphs, pupae, and (very rarely) adults of other insects. A number of the species of *Tetrastichus* are hyperparasites. Further rearing work and study very well may show that some of the species of *Tetrastichus* now thought to be primary parasites are actually secondary.

Known hyperparasites in this list are indicated by a dagger, and the primary host (when known) is given in parentheses; an asterisk is placed before those species which are probably or possibly secondary parasites; and those species having a questionable host record are indicated by a double dagger.

Host

Parasite

ORTHOPTERA

<i>Blatta orientalis</i> Linnaeus	<i>hagenowii</i> (Ratzeburg)
<i>Blattella germanica</i> (Linnaeus)	<i>hagenowii</i> (Ratzeburg)
<i>Oecanthus</i> sp.	<i>oecanthivorus compar</i> Gahan
<i>Periplaneta americana</i> (Linnaeus)	<i>hagenowii</i> (Ratzeburg)
<i>Periplaneta australasiae</i> (Fabricius)	<i>hagenowii</i> (Ratzeburg)

ODONATA

<i>Lestes</i> sp.	<i>polynemae</i> Ashmead
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THYSANOPTERA

<i>Gynaikothrips uzeli</i> (Zimmerman)	<i>thripophonus</i> Waterston
<i>Liothrips laureli</i> (Mason)	<i>thripophonus</i> Waterston
<i>Liothrips urichi</i> Karny	<i>thripophonus</i> Waterston

HOMOPTERA

<i>Aphis gossypii</i> Glover	* <i>minutus</i> (Howard)
<i>Aphis maidis</i> Fitch	‡ <i>marylandensis</i> (Girault)
<i>Aphis pomi</i> De Geer	* <i>minutus</i> (Howard)
<i>Aphis</i> spp.	* <i>minutus</i> (Howard)
<i>Calophya nigripennis</i> Riley	‡ <i>triozae</i> Burks
<i>Lecanium corni</i> Bouché	* <i>minutus</i> (Howard)
<i>Lecanium nigrofasciatum</i> Pergande	* <i>minutus</i> (Howard)
<i>Lecanium persicae</i> (Fabricius)	* <i>minutus</i> (Howard)
<i>Paratrioza cockerelli</i> (Sulc)	<i>triozae</i> Burks
<i>Phenacoccus acericola</i> (King)	* <i>minutus</i> (Howard)
<i>Phenacoccus helianthi</i> Cockerell	* <i>minutus</i> (Howard)
<i>Physokermes insignicola</i> (Crawford)	* <i>minutus</i> (Howard)
<i>Pulvinaria bigeloviae</i> Cockerell	* <i>minutus</i> (Howard)
<i>Saissetia oleae</i> (Bernard)	* <i>minutus</i> (Howard)
<i>Trioza</i> spp.	<i>dyrus</i> Burks
	<i>gelastus</i> Burks

NEUROPTERA

<i>Chrysopa oculata</i> Say	<i>chrysopae</i> (Crawford)
<i>Chrysopa plorabunda</i> Fitch	<i>chrysopae</i> (Crawford)
<i>Chrysopa rufilabris</i> Burmeister	<i>chrysopae</i> (Crawford)
<i>Malacomysa westwoodi</i> (Fitch)	<i>caerulescens</i> Ashmead

Host

Parasite

COLEOPTERA

<i>Agrilus arcuatus</i> (Say)	<i>rugglesi</i> Rohwer
<i>Agrilus champlaini</i> Frost	<i>rugglesi</i> Rohwer
<i>Agrilus rubicola</i> Abeille	<i>rugglesi</i> Rohwer
<i>Agrilus sinuatus</i> Olivier	<i>agrili</i> Crawford
<i>Anthonomus grandis</i> Boheman	<i>hunteri</i> Crawford
<i>Anthonomus juniperinus</i> Sanborn	‡ <i>marcovitchi</i> (Crawford)
	‡ <i>juniperi</i> (Crawford)
<i>Apion</i> sp.	* <i>caerulescens</i> Ashmead
<i>Blepharida rhois</i> (Forster)	<i>ovipransus</i> Crosby and Leonard
<i>Chirida signifera</i> (Herbst)	<i>cassidis</i> Burks
<i>Chlamys gibbosa</i> (Fabricius)	<i>chlamytis</i> Ashmead
<i>Chlamys</i> sp.	<i>chlamytis</i> Ashmead
<i>Chrysobothris femorata</i> Olivier	<i>holbeini</i> Girault
<i>Chrysobothris mali</i> Horn	<i>holbeini</i> Girault
<i>Chrysobothris</i> sp.	<i>holbeini</i> Girault
<i>Coccinella 5-notata</i> Kirby	<i>melanis</i> Burks
<i>Coccinella</i> sp.	<i>melanis</i> Burks
<i>Compsus auricephalus</i> (Say)	<i>compsivorus</i> Crawford
<i>Criocoris asparagi</i> (Linnaeus)	‡ <i>asparagi</i> Crawford
<i>Cycloneda sanguinea</i> (Linnaeus)	<i>minutus</i> (Howard)
<i>Cylindrocopturus adpersus</i> (LeConte)	<i>ainstiei</i> Gahan
<i>Cymatodera</i> sp.	<i>thanasimi</i> Ashmead
<i>Galerucella xanthomelaena</i> (Schrank)	<i>brevistigma</i> Gahn
	<i>xanthomelaenae</i> (Rondani)
<i>Gerstaeckeria nobilis</i> (LeConte)	<i>gerstaeckeriae</i> Gahan
<i>Gerstaeckeria porosa</i> (LeConte)	<i>gerstaeckeriae</i> Gahan
<i>Hypera nigrirostris</i> (Fabricius)	‡ <i>nebraskensis</i> (Girault)
<i>Languria mopardi</i> (Latreille)	<i>gibboni</i> (Girault)
<i>Metrona bicolor</i> (Fabricius)	<i>cassidis</i> Burks
<i>Microrhopala xerene</i> (Newman)	<i>microrhopalae</i> Ashmead
<i>Mordellistena pustulata</i> Melsheimer	<i>ainstiei</i> Gahan
<i>Mordellistena</i> sp.	<i>ainstiei</i> Gahan
<i>Orchestes pallicornis</i> (Say)	<i>malophilus</i> Burks
	<i>xanthops</i> Ratzeburg
<i>Physonota unipunctata</i> (Say)	<i>whitmani</i> (Girault)
<i>Scolytus rugulosus</i> Ratzeburg	<i>scolyti</i> Ashmead
<i>Thanasimus trifasciatus</i> Say	<i>thanasimi</i> Ashmead
<i>Thanasimus</i> sp.	<i>thanasimi</i> Ashmead
<i>Tychius lineellus</i> LeConte	* <i>caerulescens</i> Ashmead

LEPIDOPTERA

<i>Ancyliis comptana</i> (Froelich)	<i>dolosus</i> Gahan
<i>Barbara colfaxiana</i> (Kearfott)	<i>strobilus</i> Burks
<i>Coleophora malivorella</i> Riley	<i>caerulescens</i> Ashmead
<i>Coloradia pandora</i> Blake	<i>pandora</i> Burks
<i>Exoteleia pinifoliella</i> (Chambers)	‡ <i>marylandensis</i> (Girault)
<i>Fascista cercerisella</i> (Chambers)	<i>dolosus</i> Gahan
<i>Gnorimoschema gallaesolidaginis</i> (Riley)	* <i>paracholus</i> Burks
<i>Malacosoma americana</i> (Fabricius)	<i>malacosomae</i> Girault
<i>Malacosoma disstria</i> Huebner	<i>malacosomae</i> Girault
	<i>silvaticus</i> Gahan
<i>Malacosoma fragilis</i> Stretch	<i>malacosomae</i> Girault

Host

Parasite

LEPIDOPTERA—Continued

<i>Paraleucoptera albella</i> (Chambers)	‡ <i>punctatifrons</i> (Girault)
<i>Rhyacionia frustrana</i> (Comstock)	‡ <i>marylandensis</i> (Girault)
<i>Rhyacionia frustrana bushnelli</i> (Busck)	<i>longicorpus</i> (Girault)
<i>Rhyacionia buoliana</i> (Schiffermuller)	<i>turionum</i> (Hartig)

DIPTERA

<i>Asphondylia bea</i> Felt	‡ <i>sobrius</i> Gahan
<i>Asphondylia websteri</i> Felt	<i>sobrius</i> Gahan
	‡ <i>venustus</i> Gahan
<i>Asteromyia agrostis</i> (Osten Sacken)	<i>lasius</i> Burks
<i>Asteromyia carbonifera</i> (Felt)	<i>fumipennis</i> (Girault)
<i>Asteromyia</i> sp.	<i>tesserus</i> Burks
<i>Cecidomyia</i> sp.	<i>tesserus</i> Burks
<i>Dasyneura leguminicola</i> (Lintner)	‡ <i>nebraskensis</i> (Girault)
<i>Diarthronomyia hypogaea</i> (Loew)	<i>diarthronomyiae</i> Gahan
<i>Diarthronomyia occidentalis</i> (Felt)	‡ <i>hibus</i> Burks
<i>Eurosta solidaginis</i> (Fitch)	* <i>solidaginis</i> Burks
<i>Lasioptera</i> sp.	<i>tesserus</i> Burks
<i>Monarthropalpus buxi</i> (Laboulbene)	<i>flora</i> (Girault)
<i>Phytophaga destructor</i> (Say)	<i>ainsliei</i> Gahan
	<i>carinatus</i> Forbes
	‡ <i>productus</i> Riley
<i>Rhagoletis fausta</i> (Osten Sacken)	<i>faustus</i> Burks
"Syrphid," undetermined	<i>acneoviridis</i> (Girault)

HYMENOPTERA

<i>Amphibolips cinereae</i> (Ashmead)	<i>racemariae</i> Ashmead
<i>Amphibolips prunus</i> (Walsh)	<i>racemariae</i> Ashmead
<i>Amphibolips racemaria</i> (Ashmead)	<i>racemariae</i> Ashmead
<i>Anagyrus</i> sp.	
(<i>Pseudococcus maritimus</i> (Ehrhorn))	‡ <i>minutus</i> (Howard)
<i>Andricus californicus</i> Bassett	<i>gigas</i> Burks
<i>Andricus flocci</i> (Walsh)	<i>racemariae</i> Ashmead
<i>Andricus kingi</i> Bassett	<i>spilopteris</i> Burks
<i>Andricus lasius</i> Ashmead	<i>racemariae</i> Ashmead
<i>Apanteles atalantae</i> (Packard)	
(<i>Vanessa atalanta</i> (Linnaeus))	‡ <i>modestus</i> Howard
<i>Apanteles carpatus</i> (Say)	
(<i>Tinea fuscipunctella</i> Haworth)	
(<i>Tinea pellationella</i> Linnaeus)	‡ <i>carpatus</i> Burks
(<i>Tineola biselliella</i> Hummel)	
<i>Apanteles glomeratus</i> (Linnaeus)	
(<i>Pieris rapae</i> (Linnaeus))	‡ <i>rapo</i> (Walker)
<i>Apanteles</i> sp.	
(<i>Apatela americana</i> (Harris))	‡ <i>tibialis</i> (Ashmead)
(<i>Desmia funeralis</i> Huebner)	‡ <i>modestus</i> Howard
(<i>Polygonia interrogationis</i> (Fabricius))	‡ <i>modestus</i> Howard
(various Lepidoptera)	‡ <i>caerulescens</i> Ashmead
<i>Aphyeus lounsburyi</i> (Howard)	
(<i>Lecanium</i> sp.)	‡ <i>minutus</i> (Howard)
<i>Arge dulciaria</i> (Say)	<i>hylotomae</i> (Ashmead)
<i>Arge pectoralis</i> (Leach)	<i>hylotomae</i> (Ashmead)

Host

Parasite

HYMENOPTERA—Continued

<i>Aulacidea podagrae</i> (Bassett)	<i>cormus</i> Burks
<i>Bruchophagus funebris</i> (Howard)	<i>bruchophagi</i> Gahan
	‡ <i>venustus</i> Gahan
<i>Callirhytis bicornis</i> McCracken and Egbert	<i>spilopteris</i> Burks
<i>Callirhytis blastophaga</i> (Ashmead)	<i>blastophagi</i> (Ashmead)
<i>Callirhytis pomiformis</i> (Bassett)	<i>racemariae</i> Ashmead
	<i>pattersonae</i> Fullaway
<i>Chrysocharis</i> sp.	‡ <i>xanthops</i> (Ratzeburg)
<i>Diptolepis china</i> (Osten Sacken)	<i>pattersonae</i> Fullaway
<i>Diptolepis ignotus</i> (Osten Sacken)	<i>rosae</i> Ashmead
<i>Diptolepis ostensackeni</i> (Beutenmüller)	‡ <i>rosae</i> Ashmead
<i>Disholcaspis chrysolepidis</i> (Beutenmüller)	‡ <i>pattersonae</i> Fullaway
<i>Disholcaspis cinerosa</i> (Bassett)	<i>phegus</i> Burks
<i>Disholcaspis globulus</i> Fitch	<i>impevus</i> Girault
<i>Disholcaspis mamma</i> (Walsh)	<i>phegus</i> Burks
	<i>racemariae</i> Ashmead
<i>Dryophanta emoryi</i> Ashmead	‡ <i>ichthys</i> Burks
<i>Dryophanta polita</i> (Bassett)	<i>racemariae</i> Ashmead
<i>Euplectrus comstockii</i> Howard	
(<i>Caradrina</i> sp.)	‡ <i>dolosus</i> Gahan
<i>Euplectrus plathypenae</i> Howard	
(<i>Plathypena scabra</i> (Fabricius))	‡ <i>dolosus</i> Gahan
(various Lepidoptera)	‡ <i>euplectri</i> Gahan
<i>Euplectrus</i> sp.	
(<i>Lina scripta</i> (Fabricius))	‡ <i>scriptus</i> Burks
(<i>Palaearcta vernata</i> (Peck))	‡ <i>dolosus</i> Gahan
<i>Fenusa ulmi</i> (Sundevall)	<i>xanthops</i> (Ratzeburg)
<i>Heterococcus pacificus</i> Ashmead	<i>phegus</i> Burks
<i>Meteorus</i> sp.	
(various Lepidoptera)	‡ <i>euplectri</i> Gahan
<i>Microbracon gelechiae</i> (Ashmead)	
(<i>Canarsia hammondi</i> Riley)	‡ <i>caerulescens</i> Ashmead
<i>Microbracon</i> sp.	‡ <i>caerulescens</i> Ashmead
<i>Neodiprion</i> sp.	‡ <i>hyliotomae</i> (Ashmead)
<i>Neuroterus batatus</i> Fitch	<i>racemariae</i> Ashmead
<i>Neuroterus floccosus</i> (Bassett)	<i>verrucarii</i> Balduf
<i>Neuroterus niger</i> Gillette	<i>verrucarii</i> Balduf
<i>Neuroterus rileyi</i> (Bassett)	‡ <i>ichthys</i> Burks
	<i>neuroteri</i> (Ashmead)
<i>Neuroterus saltarius</i> Weld	<i>neuroteri</i> (Ashmead)
<i>Neuroterus saltatorius</i> Riley	<i>spilopteris</i> Burks
<i>Neuroterus varians</i> Kinsey	<i>verrucarii</i> Balduf
<i>Neuroterus verrucarum</i> (Osten Sacken)	<i>baldufi</i> Burks
	<i>verrucarii</i> Balduf
	* <i>johnsoni</i> Ashmead
<i>Phanagenia bombycina</i> (Cresson)	
<i>Phanomeris phyllotomae</i> Muesebeck	
(<i>Phyllotoma</i> sp.)	‡ <i>xanthops</i> (Ratzeburg)
<i>Phyllotoma nemorata</i> (Fallen)	<i>xanthops</i> (Ratzeburg)

ARANEAE

"Argiopid," undetermined

**banksii* Howard

UNPLACED SPECIES

The following species cannot be placed satisfactorily from the published descriptions, and the types are lost, too broken to be of much assistance in identifying the species, or not at present available to me for study. Specific differences are so obscure and critical in this genus that the placing of species is impossible unless the types for all the species are available for study together.

TETRASTICHUS ACUTUS Ashmead

Tetrastichus acutus ASHMEAD, Trans. Amer. Ent. Soc., vol. 13, p. 34, 1886.—
CRESSON, Synopsis of families and genera of Hymenoptera . . . , p. 245, 1887.

This species was described from a male specimen from Florida; the type is lost.

TETRASTICHUS ALASKENSIS Ashmead

Tetrastichus alaskensis ASHMEAD, Proc. Acad. Sci. Washington, vol. 4, p. 146, 1902.

Type.—U.S.N.M. No. 5529; this type, a male, from Popof Island, Alaska, July 19, is too badly broken to be placed.

TETRASTICHUS ANTHRACINUS Ashmead

Tetrastichus anthracinus ASHMEAD, Proc. Acad. Sci. Washington, vol. 4, p. 146, 1902.—(?) BURKE, Journ. Econ. Ent., vol. 13, p. 384, 1920.

Type.—U.S.N.M. No. 5528; described from a single female from Seldovia, Alaska, July 7. This specimen is too broken to be recognizable.

TETRASTICHUS CANADENSIS Ashmead

Tetrastichus canadensis ASHMEAD, in Howard, Ent. News, vol. 17, p. 292, 1906; Redia, vol. 3, p. 390, 1906.—BARROETAVEÑA and GIROLA, Bol. Argentina Min. de Agr., vol. 20, p. 314, 1916.

This evidently is a manuscript name; the name has been quoted at least three times, but never with a description. The host originally cited by Howard was *Diaspis pentagona* Targioni-Tozzetti. There are, in the National Museum, five specimens bearing the name *Tetrastichus canadensis* Ashmead, in Ashmead's handwriting, but these specimens were reared from a gall on the leaves of *Rosa*. The exact status of this name cannot, therefore, be determined.

TETRASTICHUS CENTRICOLAE (Ashmead), new combination

Baryscapus centricolae ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 202, 1887.

Type locality.—Asheville, N. C.

Type.—U.S.N.M. No. 51756. (Specimen much broken.)

Host.—*Dryophanta centricola* (Osten Sacken).

TETRASTICHUS EPIDIUS Walker

Tetrastichus epidius WALKER, Ann. Mag. Nat. Hist., vol. 20, p. 28, 1847.—HOWARD, U. S. Bur. Ent. Bull. 5, p. 47, 1885.—CRESSON, Synopsis of families and genera of Hymenoptera . . . , p. 245, 1887.

The types, two females from Florida, were in the British Museum in 1938. At that time, Dr. Ferrière sent the following notes: "The entire body finely and closely punctate, also the propodeum and the abdomen. Median furrow of mesonotum (mesopraescutum) very weak. Inner furrows on scutellum also weak, visible only at apical half; outer furrows strong. Propodeum short; middle carina well marked; no lateral (paraspiracular) carinae; spiracles small and round . . . Abdomen elongate and pointed at apex."

TETRASTICHUS FLAVIPES Ashmead

Tetrastichus flavipes ASHMEAD, Trans. Amer. Ent. Soc., vol. 13, p. 135, 1886.—

CRESSON, Synopsis of families and genera of Hymenoptera . . . , p. 245, 1887.

Ceranisus flavipes (Ashmead) ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 202, 1887.

Ceranisus flaviceps ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 202, 1887.

T. flavipes was described from a female specimen from Florida; the type has subsequently been lost. The name *flaviceps*, published without description, was undoubtedly a misspelling of *flavipes*.

TETRASTICHUS FLAVOPICTUS (Ashmead), new combination

Ceranisus flavopictus ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 202, 1887.—

GIRAULT, Ann. Ent. Soc. Amer., vol. 9, p. 300, 1916.

No types for this species can be found; in 1916 Girault stated, "types too mutilated to place . . . Species hopeless."

TETRASTICHUS GALA Walker

Tetrastichus gala WALKER, Ann. Mag. Nat. Hist., vol. 20, p. 28, 1847.—HOWARD,

U. S. Bur. Ent. Bull. 5, p. 47, 1885.—CRESSON, Synopsis of families and genera of Hymenoptera . . . , p. 245, 1887.

The type, a single female from Florida, was in the British Museum in 1938. Dr. Ferrière kindly furnished the following notes: "Body reddish yellow, more or less brownish in the thoracic sutures and on the sides of the propodeum near the postscutellum (metanotum); abdomen with transverse brown stripes. Hindwing acute at apex. Propodeum short, almost smooth; median carina short; no lateral (paraspiracular) carinae."

This species is evidently close to, or identical with, that called *T. marylandensis* Girault in this synopsis.

TETRASTICHUS GRANULATUS Walker

Tetrastichus granulatus WALKER, Ann. Mag. Nat. Hist., vol. 14, p. 17, 1844.—

HOWARD, U. S. Bur. Ent. Bull. 5, p. 47, 1885.—CRESSON, Synopsis of families and genera of Hymenoptera . . . , p. 245, 1887.

The types of this species, three females from Hudson Bay, Canada (Barnstone), were in the British Museum in 1938. Dr. Ferrière furnished these notes: "Hindwings acute at apex. Propodeum very finely shagreened, almost smooth; median carina weak and short; no carina between it and the spiracles."

TETRASTICHUS HAEMON Walker

Tetrastichus haemon WALKER, Ann. Mag. Nat. Hist., vol. 20, p. 28, 1847.—HOWARD, U. S. Bur. Ent. Bull. 5, p. 47, 1885 [*haemon*].—CRESSON, Synopsis of families and genera of Hymenoptera . . . , p. 245, 1887.

The types, three females and a male from Florida, were in the British Museum in 1938. Dr. Ferrière was at that time of the opinion that the species should be placed in *Horismenus*, as the mesopraescutum has no median furrow, and the mesoscutellum has a median furrow.

TETRASTICHUS MICROCOSMUS Girault

Tetrastichus microcosmus GIRAULT, Descriptions stellarum novarum, p. 22, 1917 (new name for *T. granulatus* Ashmead, preoccupied).

This name probably was proposed to be applied to *Aprostocetus granulatus* Ashmead at a time when Girault considered *Aprostocetus* and *Tetrastichus* not generically distinct. In no published work, however, have these two genera been combined, and I do not consider them synonymous.

TETRASTICHUS SAUNDERSII (Packard)

Eulophus saundersii PACKARD, Proc. Boston Soc. Nat. Hist., vol. 21, p. 34, 1881; HOWARD, U. S. Bur. Ent. Bull. 5, p. 46, 1885.—CRESSON, Synopsis of families and genera of Hymenoptera, . . . , p. 244, p. 1887.
Tetrastichus saundersi (Packard) HOWARD, in Scudder, Butterflies of Eastern United States, p. 1893, 1889.—VIERECK, Connecticut State Geol. and Nat. Hist. Surv. Bull. 22, p. 454, 1916.

The type, a male bred from a *Thecla* pupa, is in the Museum of Comparative Zoology.

TETRASTICHUS SEMIDEAE (Packard)

Eulophus semideae PACKARD, Proc. Boston Soc. Nat. Hist., vol. 21, p. 35, 1881.—HOWARD, U. S. Bur. Ent. Bull. 5, p. 46, 1885.—CRESSON, Synopsis of families and genera of Hymenoptera, . . . , p. 244, 1887.
Tetrastichus semideae (Packard) HOWARD, in Scudder, Butterflies of Eastern United States, p. 1893, 1889.—VIERECK, Connecticut State Geol. and Nat. Hist. Survey Bull. 22, p. 453, 1916.

The types, male and female, are in the Museum of Comparative Zoology. These type specimens were reared from pupae of the White Mountain butterfly, *Oeneis semidea* (Say), in New Hampshire.

TETRASTICHUS STANFORDIENSIS Fullaway

Tetrastichus stanfordiensis FULLAWAY, Journ. New York Ent. Soc., vol. 20, p. 281, 1912.

The single female type of this species cannot now be found. It was originally supposed to be in the collection of Stanford University, and bore the numbers Lot 497, sub. 8. It was reared from a pimply gall (possibly *Cynips douglasii* Ashmead) on California blue oak (*Quercus douglasii*); further rearing of material from this gall should yield specimens that could be placed under this name.

TETRASTICHUS THECLAE (Packard)

Eulophus theclae PACKARD, Proc. Boston Soc. Nat. Hist., vol. 21, p. 34, 1881.—HOWARD, U. S. Bur. Ent. Bull. 5, p. 46, 1885.—CRESSON, Synopsis of families and genera of Hymenoptera . . . , p. 244, 1887.

Tetrastichus theclae (Packard) HOWARD, in Scudder, Butterflies of Eastern United States, p. 1893, 1889.—VIERECK, Connecticut State Geol. and Nat. Hist. Survey Bull. 22, p. 454, 1916.

The type of this species, a male reared from a *Thecla* pupa, is in the Museum of Comparative Zoology.

TETRASTICHUS TRISULCATUS Provancher

Tetrastichus trisulcatus PROVANCHER, Additions et corrections à la faune hyménoptérologique . . . Canada, p. 211, 1887.—ROHWER and GAHAN, Can. Ent., vol. 50, p. 198, 1918.

The types are in the Harrington collection, Canadian National Museum, Ottawa, Ontario. In 1915, Mr. Gahan made the following notes from the type: "Apparently has but a single bristle on submarginal vein, . . . first funicle joint much longer than the pedicel (about twice), the funicle joints all nearly equal in length, the third very slightly shortest. Club not quite equal to second and third funicle combined. . . All femora black, tibiae pale."

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[Accepted names are in roman, synonyms in *italics*]

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